

HOME AND VILLAGE DOCTOR



SATISH CHANDRA I

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INTRODUCTORY

This book had to be written to follow up a work taken in hand, the first outcome of which was the "Cheap Remedies". In the "Cheap Remedies" certain medicines were described which could be used with advantage for treating patients at a small cost "Cheap Remedies" however did not contain description of diseases and the methods of dealing with those diseases. A book on medicine was needed for that "Cheap Remedies" was written at the instance of Gandhiji. He now requested me to get a book on medicine written in which methods of treatment were to be indicated with the help of a few and very common drugs.

I approached several doctors for taking up the work. I, however, could not succeed to get any one who would undertake the work on the lines indicated by Gandhiji. Later on, Gandhiji desired me to take up the work as I could not secure any one qualified for the work.

We had a hospital at Suiah in the suburbs of Calcutta in which patients were being treated exclusively with the help of medicines mentioned in the "Cheap Remedies". The successful treatment of numerous indoor and outdoor patients inspired us with hope of bringing out the book on treatment of diseases. I had to add to my meagre knowledge by reading books and consulting those friends who were

willing to help me and whom I could approach. The book was undertaken in 1935 and completed in 1937. It was my desire that Gandhiji should see the typed manuscript before the book was taken up for publication. But he had no time and he desired me to go on with printing. With reluctance the printing was undertaken in 1939 and it took nearly a year to get the book through the press.

When I approached Dr. K. C. Bose with the request for writing the book, he put a very pertinent question to me as to the standard of knowledge of readers for whom the book was intended. I had to think out a reply and told him that we might start with something definite if a preliminary chapter on Human Body was written. Readers going through that chapter would then be able to follow up what was coming after ; and we could impart as much preliminary knowledge through the first chapter as we liked. We agreed upon this scheme. The chapter on Human Body or the physiology portion of the book was then written. But Dr. Bose could not get the work taken up by himself or by any of his co-workers for their pre-occupations. After that I had to take up the entire burden.

The book is intended for the village workers who want to help the villagers as doctors and want to acquire the necessary qualification. It is also intended for the intelligent householder who wants to prevent diseases in his family and in case of disease wants to be of as much use to the patient as possible by way of treating him. It is not intended to replace the

qualified doctor but to aid people in preserving health and in getting cured in simple cases where the aid of a qualified doctor cannot be had or is beyond the means of the sufferer.

After having made some familiarity with the mechanism of the Human Body in the first chapter, the reader is taken through the chapter on Care of the Systems. Knowing the various systems at work in the human frame, the second chapter on how to take care of the systems comes naturally and provides a common knowledge which everybody need acquire for keeping the body in a fit condition. It is a great thing to know what constitutes the use and misuse of the various systems at work in the body and in this chapter the reader will find sufficient materials by attending to which many diseases and much of the suffering may be avoided.

In order to build up health properly one must know what to take and what to avoid as food. This is somewhat elaborately dealt with in chapter III on Nutrition. The schedule of dietary given is a tried one and it is hoped that the materials provided for constructing a rational diet will be found useful by men who have no technical knowledge of the science of nutrition.

The next chapter IV is on Hygiene and Sanitation. In a few pages the problem of village sanitation and that of home has been dealt with. It has been indicated how by a little additional care and trouble we may convert dirt and waste into useful materials and avoid much of preventible diseases.

Chapter V is on Nursing. Practical directions are given for dealing with various cases of ailments and the duty of the attendant or the nurse.

On nursing depends a great deal of the course a disease takes. Much ignorance has to be dispelled and common knowledge on points of nursing is a great necessity. Within the scope of nursing comes the use of water, air and exercise as remedial measures in a great many diseases. It has been attempted to be brought out that disease is to be prevented by knowing and taking proper care of the system. Still should there be disease, much can be done by proper nursing alone. And if there is a necessity of giving some medicine, the matter is taken up in the next chapter VI on Home Treatment of Symptoms.

The symptoms are systematically dealt with and directions are given for treating them with the help of 24 well-known common remedies, which are expected to be within the reach of a villager. The next chapter VII is on the Care of Mother and Child, a subject much neglected and which needs great attention. Child mortality is great and the ignorance of the attendants in cases of delivery is very great indeed. The technical part of this chapter was taken as notes from an eminent gynaecologist who does not want to have his name made public. This eminent friend Dr. D—spent on an average two hours daily and regularly for two months for lecturing and giving notes to me on a subject which is of fascinating interest to him and on which he is an acknowledged

expert But for him the chapter would not have been what it is

General information ends with chapter VIII on Accidents Chapter IX is on Cheap Remedies being a new edition of the old book. In chapters X to XVIII, diseases are systematically treated—the scope of treatment being limited to the drugs mentioned in the Cheap Remedies.

In the chapter on Home Treatment of Symptoms attempt has been made to keep the cost of a course of a week's treatment within an anna Throughout the book stress has been laid on methods of prevention than on healing Disease should be prevented But when diseases occur, nature should be helped to heal by judicious application of water, air, sunlight, exercise and abstention from food. Medicines are relied upon only to a limited extent and cheapness in treatment even at the cost of efficiency has been the aim

The book has behind it the experience of over ten thousand cases treated in the various institutions connected with the Khadi Pratisthan for the past seven years, according to the lines indicated The manuscript was read very thoroughly by Dr Indranarayan Sen Gupta, M B late I. M S with me Dr G L Batra M.B., Ch B (Edin), D P H, Assistant Director of Public Health, Bengal, now retired, has out of love for me, gone through the entire manuscript. Dr. Niren Dutt is one of our co-workers. He has helped me throughout the work. On Dr. Nabin Chandra Nath, L. M. F., another co-worker

of mine fell the task of seeing the book through the press.

In writing this book I have tried to discharge the duty which fell on me in spite of my serious attempts to avoid it. Unworthy of the task as I am, once the duty came to me I gave all the time to it that I could give, always attempting to increase my fund of knowledge by studying, by receiving lessons and by observations. Gandhiji wanted to serve the poor by making treatment cheap for them. It is merely an attempt in that direction.

SATISH CHANDRA DAS GUPTA

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Affections of eyes & eyelids, 1847 ; Sty or hordeolum, 1847 ; Tinea tarsi or blepharitis, 1847 ; Watery eye or epiphora, 1848 ; Conjunctivitis, 1849 ; Purulent conjunctivitis, 1850 ; Granular conjunctivitis, 1850 ; Corneal ulcer, 1850 ; Optic neuritis, 1851 ; Iritis, 1852 ; Cataract, 1852 ; Glaucoma, 1853 ; Night blindness, 1853 ; Diseases of the ear, 1853 ; Otorrhœa, 1855 ; Diseases of the nose, 1857 ; Epistaxis, 1857 ; Skin diseases, 1858 ; Erythema, 1858 ; Roseola, 1858 ; Urticaria, 1858 ; Leucoderma, 1859 ; Ringworm, 1860 ; Scabies, 1861 ; Pruritus, itching, 1868 ; Herpes, 1868 ; Eczema, 1864 ; Blebs, 1865 ; Prickly heat, 1866 ; Psoriasis 1866 ; Chaps, 1867 ; Corns, 1867 ; Diseases of anus & rectum, 1868 ; Piles, haemorrhoids, 1868 ; Urinary diseases, 1870 ; Retention of urine, 1870 ; Retention with overflow, 1871 ; Diseases of women, 1872 ; Mastitis, 1872 ; Breast abscess, 1872 ; Leucorrhœa, 1872 ; Dysmenorrhœa, 1875 ; Uterine haemorrhage, 1878 ; Amenorrhœa, 1881 ; Certain complications peculiar to women & causations, 1888.

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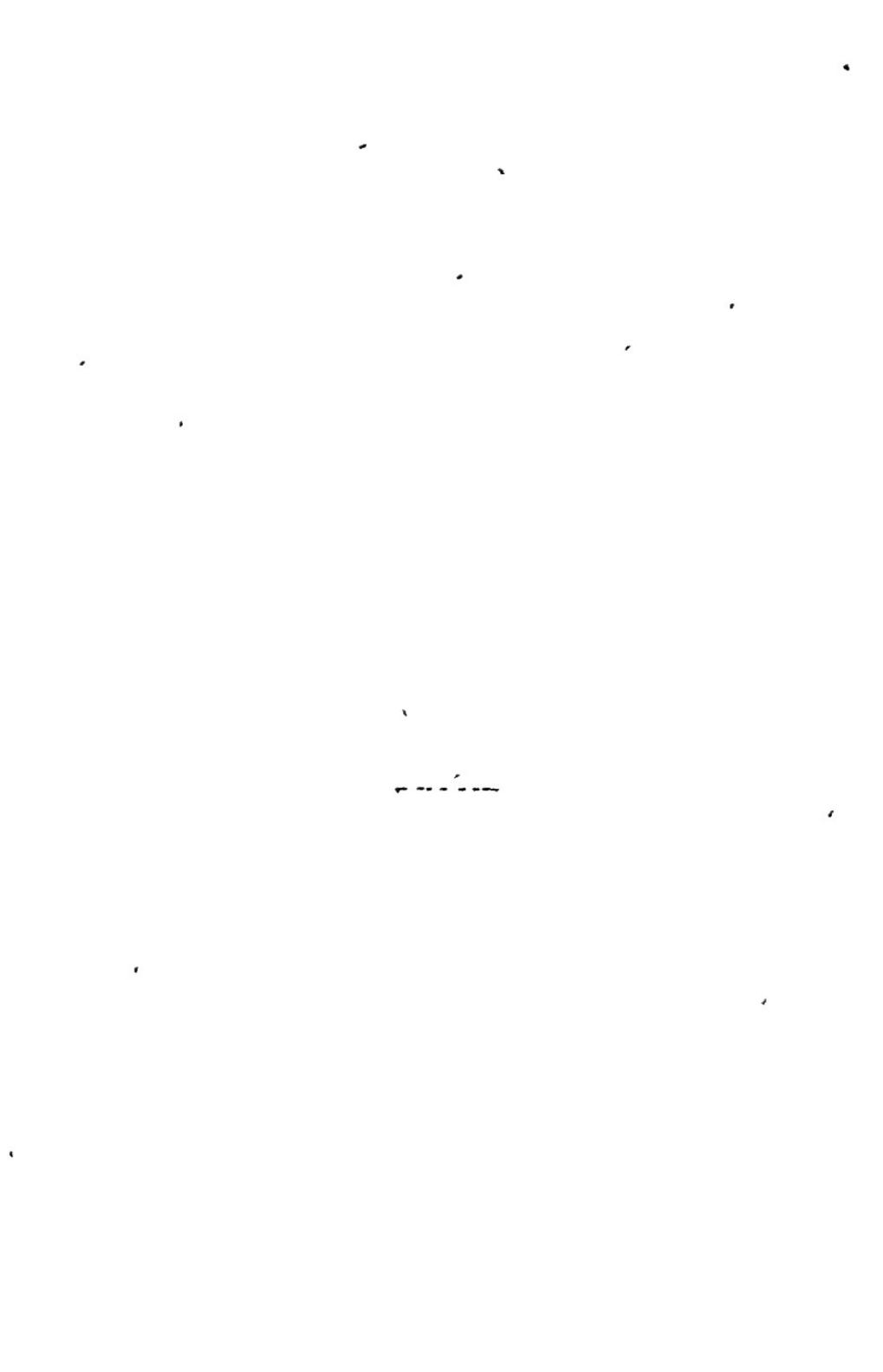
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CHAPTER—I

THE HUMAN BODY

The human body begins with one ovum or egg, a single cell. A cell is the smallest living unit. This ovum divides itself in the mother's womb and from one becomes two, from two become four and so on. For development into human being ovum only is not enough. The ovum of the mother combines with the sperm of the father and this composite thing, this cell, is the beginning of human living body. The composite cell of ovum and sperm lodges itself in the mother's womb and begins to build for itself this intricate human body.

The soul as the engineer, goes on shaping its body from the time of its inception upto the time of its death. The soul's hammer bangs in the heart ceaselessly day and night. What sort of structure is it shaping for itself? The Master Architect builds the frame in the mother's womb from materials obtained from the father's and mother's body. Assimilation of materials and disposal of waste product, recuperation and waste go on side by side. This is the life process. One stage of the process ends with coming out of the mother's womb. Independent development of a vigorous nature continues upto attainment of maturity,

but even after that, building work continues. As the man grows and shapes his character, he shapes his organs in unison also. The brain, bones, muscles, all try to shape themselves to the conditions of work taken out of them. In religious men a particular portion of the brain which is the seat of moral sentiments begins to develop more and more. The growth continues so long as the change in the man continues. In men of criminal character those centres of brain which are the seats of lower passions get more developed. Changes in the brain thus wrought make the man habitually honest or dishonest. So the man creates for himself what he is. This applies to individuals as also by expansion to nations.

The soul having built the body for itself, the one purpose for which it should be utilised is the service of God. Man is remarkably a superior being to other created nature in as much as in man alone the perception of God is developed. The human body may be tuned to the Divine Will. Saints have demonstrated this. The chief duty of the happy possessor of a human body would therefore be to keep the body fit for service to God.

Service cannot be rendered properly without a fit body and a fit mind, the two are inseparably connected. It is the duty of every one to try to live in good health, preserving the body as a sacred trust, utilising it every moment by thought and deed for the service of God. When the body, following the laws of nature, decays and becomes unfit for the habitation of the soul, then one should be equally prepared to give it up cheerfully,

without regret and allow the elements of the body to return to earth from which it was built

When we look at the vastness of natural phenomena about us, we are struck with wonder. The deep surging ocean, the inaccessible mountain, the starred dome of the sky, fill us with wonder. All these follow the laws of nature. The sun rises and sets in unerring regularity, the seasons change, the plants flower without anybody watching or directing them. They follow the laws of nature.

The same wonderful vastness and romantic phenomena are observable in this abode of soul, the human body, and they strictly follow the same unerring laws of nature. The red fluid called blood is rushing through the arteries ceaselessly, without interruption day and night. A tiny automatic self-governed self-adjusted pump called the heart, is keeping blood in continuous circulation. The veins are channels for returning back the used up blood for rejuvenation at every stroke of the pump. The various factories in which the components of the cells of blood are manufactured and purified are wonderful. Every little thing connected with the construction and maintenance of the body exhibits consummate skill of the Maker.

It may be said that the soul is the cause of the making of this body of ours. Unconsciously we are building up our own body. The involuntary operations of respiration, circulation, digestion and excretion are going on in us. How wonderful it is again that we ourselves are performing these operations without even

being conscious that these processes are going on. If we understand the mechanism of the human body it will certainly be helpful in managing it in health and in disease.

24/24 (9 $\frac{2}{10}$)

Components of the Body

We all commonly know that the body is built from clay. By this we mean that our body is built up by the food we take and we obtain our food from what comes out of the soil. Even those who eat flesh will find that ultimately the flesh comes from animals, which in their turn live on products of the soil. But we may go one step forward and ask how does our food build our body? The body is built from food by the medium of blood. The useful portion of what we eat is converted into blood and the useless portions are thrown out as excreta. In other words we eat usefully that portion of our food only which we can convert into blood. Blood is the medium through which our body is built up.

The clever mechanism of hunger, of salivation and of taste are all intended for the purpose of supplying blood to the human system, for recuperating its losses and for building up or developing the various organs. We eat primarily for satisfying our hunger. But the call of hunger is sent out by the system when it wants more blood for carrying on its processes. Hunger therefore, though a call for food, is really a call for blood. The bones and flesh, the nerves, arteries and veins, the skin, nails, hair and the teeth, the brain, lungs, liver, kidneys and entrails, are all made from

blood It is the one wonderful thing that converts itself into so many forms, building up the entire body in all its complexity When we breathe we take up air or oxygen We 'eat' this air also to form arterial blood and to purify waste blood All that is found in human body must necessarily therefore be found in blood We shall take the various forms to which the blood changes itself, one by one We shall first of all take up the tissues generally

Tissues of the Body

A collection of large number of cells forms a tissue There are several kinds of tissues in the body .—

- (1) Epithelial or covering tissue
- (2) Connective or binding tissue
- (3) Muscular tissue or what is commonly known as flesh
- (4) Nervous tissue or message carrying tissue
- (5) Blood and blood vessels
- (6) Bony tissue.

Epithelial tissues are composed of layers of cells placed in close apposition It is found in the outermost coating of the skin, in the living membrane inside the windpipe, gullet, stomach and the intestines Epithelial tissues line the ducts of glands also

Connective tissues are the ones lying underneath the skin between the skin and the muscle Bones and cartilages, blood and blood vessels are included in the connective tissues. Fat of the body is nothing but connective tissue the cells of which are full of fat.

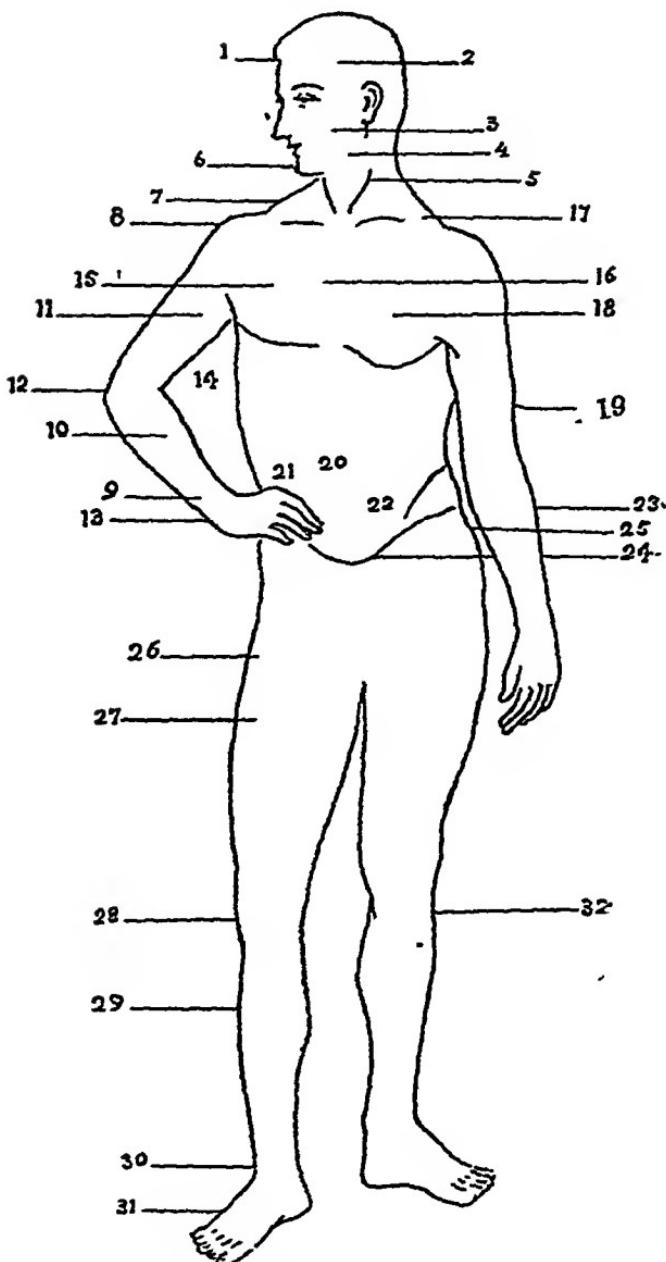


Fig. 1. The human body.

1. Forehead 2. Temple, 3. Cheek, 4. Jaw, 5. Neck, 6 Chin-
7. Trachea, 8. Collar, 9. Hand, 10. Forearm, 11. Upper arm,
12. Elbow, 13. Wrist, 14. armpit, 15. Right breast, 16. Chest,
17. Shoulder, 18. Left breast, 19. Arm, 20. Abdomen
21. Liver, 22. Spleen, 23. Groin, 24. Pelvis, 25. Hip, 26. Groin,
27. Thigh, 28. Knee, 29. Shin, 30. Ankle, 31. Foot, 32. Leg.

Muscular tissues or muscles lie underneath the skin, separated from it by subcutaneous materials of fatty and connective tissues. Muscle is commonly known as flesh. These fill the space over or between the bones and help articulation and motion. They are of various shapes. Some are thicker in the middle and tapering at ends. They are usually fixed to bones by what are called tendons. Muscles allow themselves to be easily split into bundles which again can be split into threads or fibres.

Nervous tissues Between the muscles are delicate white chords which are nerves. They serve the purpose of carrying messages or sensations from and to the brain. Blood consists of large number of minute bodies called corpuscles floated in a fluid called plasma. It is the most important tissue matter concerned in the building up of the body. Bones are the hardest tissue matter in the body. They are formed by the same processes as other tissues are formed and contain in their hollow cavities a substance called marrow which produce red blood corpuscles.

Structure Of The Body

The body consists of head, trunk, upper limbs of arm, forearm and hand and lower limbs of thigh, leg and foot.

The head consists of skull and face and is connected by neck to trunk. The contents of the cavity of the trunk are called viscera. The cavity is divided into two parts. The upper part is called thorax and the lower part abdomen.

The Organs of Thorax

The thorax is placed within a bony cage of ribs and is separated from the abdomen by a partition of muscle called diaphragm. There is no communication between the two sides of the diaphragm. Tubes from the mouth carrying food and veins and arteries pass through the diaphragm to the abdomen.

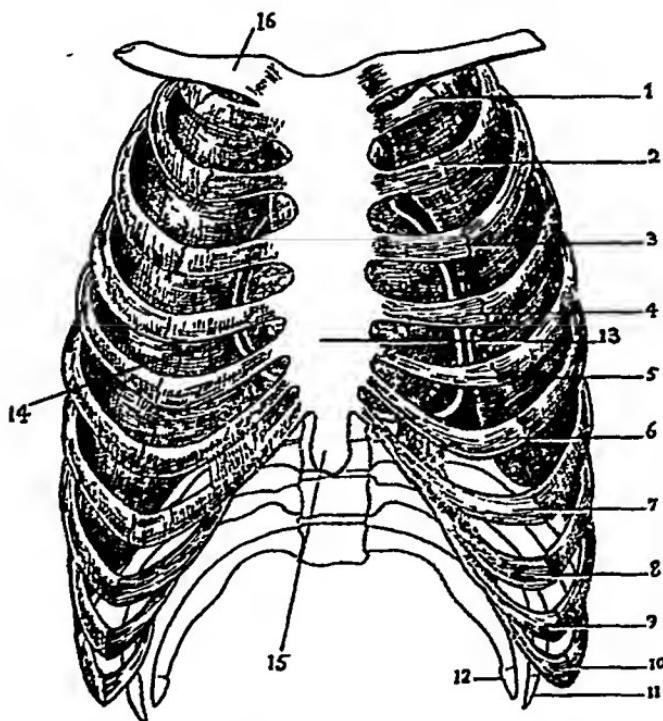


Fig. 2 Thorax showing heart and lungs
1 to 12 Ribs, 13. Heart, 14 Lungs, 15. Sternum, 16. Clavicle.

The thorax holds the lungs and the heart. The lungs are covered by two membranes, one for each side of the chest and in between the two lungs is placed the heart. The lungs are held in place without attachment to sides except at the trunk where it is fixed to the wind pipes etc. and thence to the vertebral column.

The heart is placed obliquely across the front of the thorax. The apex of the heart touches the chest wall. The base of the heart is just under the sternum at the level of the third rib so that the apex is situated between the fifth and the sixth ribs. The beating of the heart can be felt through the intercostal muscles which are the muscles between the ribs. The heart sound is most distinct at one inch below and half an inch to the inner side of the left nipple.

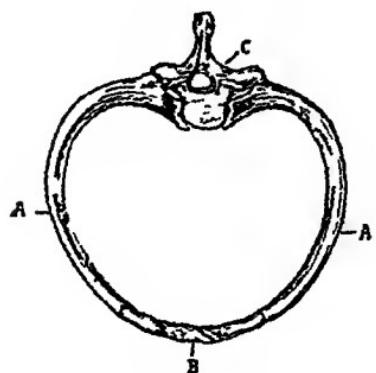


Fig 3

A hoop of Rib.
A Rib, B Sternum,
C Spine

The tube which serves as air passage at the time of breathing or inspiration and expiration is called the trachea. Just at the end of the mouth this tube is enlarged into an opening which is called larynx.

The larynx opens above through a slit like opening into a wide space called the pharynx which is continuous with the mouth.

The air passage thus begins from the back of the mouth through the pharynx and larynx. The air goes through the tube trachea. Further down, the trachea is divided into two branches carrying air to the two lungs. These are called the bronchi.

In the thorax are the blood passage mains connected with the heart. Those that take blood away from the heart or the out-going high pressure mains are the arteries and those which bring the return stream to the heart are veins. The main artery

is aorta and the principal veins connected with the heart are superior and inferior venae cavae. The superior one comes from the upper limbs and the inferior from the lower limbs. These empty their contents of blood into the heart.

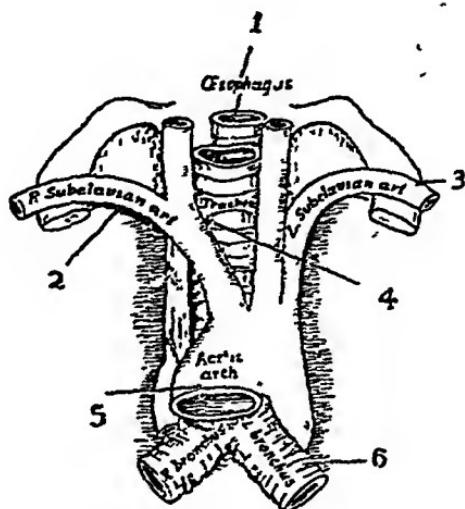


Fig. 4.

1. Oesophagus, 2. Right subclavian artery, 3. Left Subclavian artery, 4. Trachea, 5. Aortic arch, 6. Bronchus.

Working Of The Organs Of Thorax

It will be seen now that the thorax contains the organs for the two systems of circulation and respiration. The heart is the primary organ of circulation. It is verily a pump or a combination of two pumps. The heart is divided lengthwise into two parts. The left hand side receives purified blood through pulmonary veins and pumps it out through the aorta and its branches the arteries, to all parts of the body. This blood then performs the work it is sent for and gets into the return drains or veins. The

two main return drains are named *venae cavae*. These two pour the degenerated blood into the right half of the heart which at once pumps it to lungs for regeneration.

The regeneration of the blood is done in the lungs.

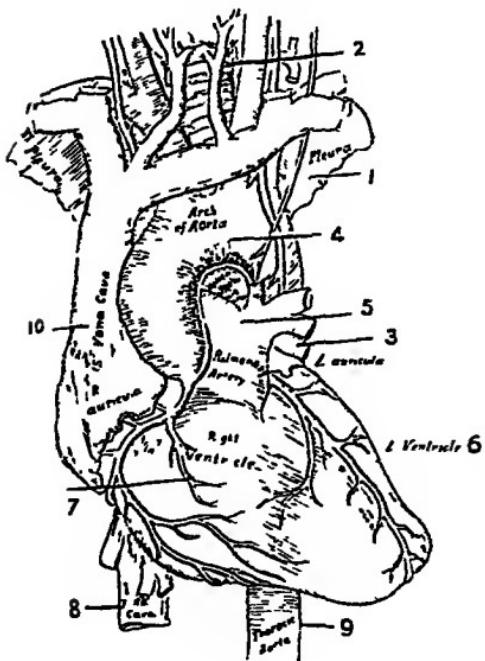


Fig. 5

1 Pleura, 2 Trachea, 3 Left auricle, 4 Arch of aorta, 5 Pulmonary artery, 6 Left ventricle, 7 Right ventricle, 8 Inferior vena cava, 9 Thoracic aorta, 10 Superior vena cava

The lung is a spongy structure formed by the closed dilated ends of an enormous number of bronchial or air tubes, where an equally enormous number of blood vessels, the capillaries lie. The heart forces degenerated blood into these blood vessels of the lungs where air acts upon it and purifies it. The purified blood comes back to left portion of the heart through the pulmonary veins and is

forced into the aorta or main artery and thence to various arteries.

The Abdominal Organs

Below the diaphragm, underneath the thorax comes the abdomen. The pipe through which the food passes down from the mouth is called oesophagus. This tube passes through the cavity of the thorax and

on the other side is continuous with the bag called stomach. From the other end of the stomach begins duodenum, further down lying in folds is the small intestine which is a tube about 21 ft. long. This tube

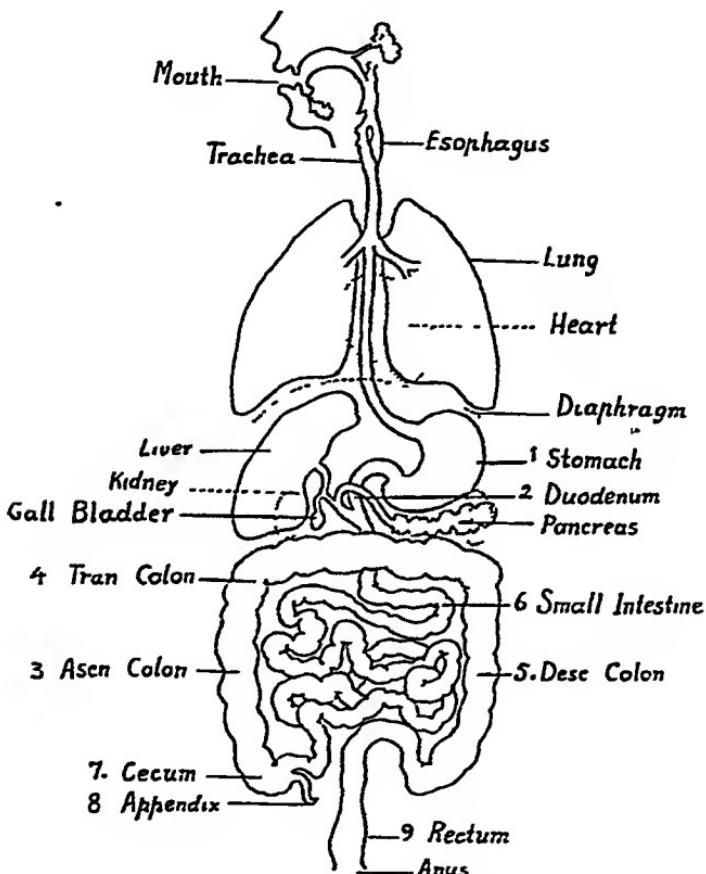


Fig. 6. Thoracic and abdominal organs

- 1 Stomach, 2 Duodenum, 3. Ascending colon,
4. Transverse colon 5. Descending colon, 6 Small intestine, 7. Cecum, 8. Appendix, 9. Rectum.

at the right side of the abdomen opens out into a wider tube called the large intestine which rises upwards and is called ascending colon and below the stomach passes across. The cross portion is called transverse

colon and then it goes down being called descending colon ending in rectum

The cæcum is the portion of the large intestine at its junction with the small intestine At this junction is

a blind tube-end called appendix The intestines are supported against the back wall of the abdomen by a transparent membrane called mesentery which carries blood vessels Some of the other important organs in the abdominal

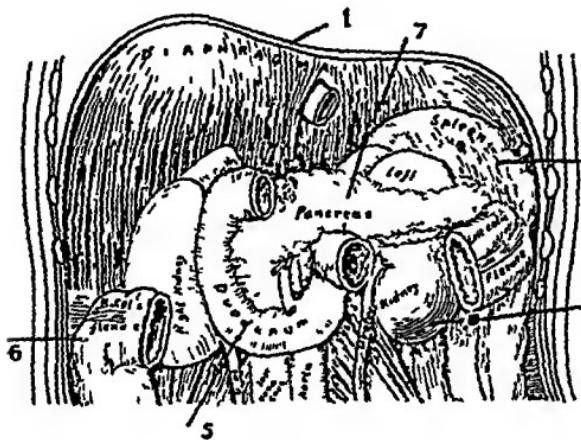


Fig. 7.

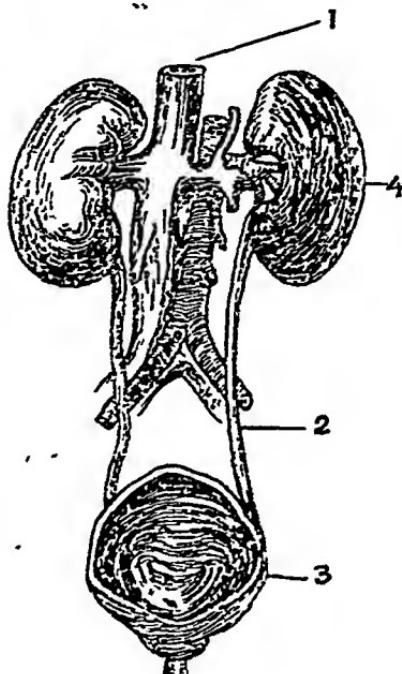
Diagram showing the abdominal organs of duodenum, pancreas, kidney, spleen, ureter, inferior vena cava, aorta and the diaphragm

cavity are the pancreas, the liver, the spleen, the kidney and the bladder

Near about the duodenum embeded in the mesentery is situated a thin greyish organ called the pancreas Then again there is a dark red mass situated immediately below the diaphragm It is the liver. Liver has got several parts called lobes On its lower surface is the gall bladder which injects its contents (bile) occasionally through a tube into the duodenum

The spleen is a small dark red organ to the left side of stomach, partly covered by the intestines Under

the intestines and a little above the middle of the abdomen on each side of the vertebral column are the brownish-red organs, the kidneys. They are about $\frac{1}{2}$ inch long and have a peculiar shape



Kidney and bladder

Fig. 8.

1 Inferior vena cava, 2 Ureter,
3. Bladder, 4. Kidney.

Two tubes called the ureters pass out of these kidneys to the bladder.

Working Of The Abdominal Organs

The abdominal organs are for assimilation of food or manufacture of blood, for purification of blood by separation of soluble impurities and for discharge of waste food materials or excreta

Food materials enter from the mouth into the oesophagus. Alongside the oesophagus lies the trachea or wind pipe. In order that no food material may pass into the wind pipe there is a flap of cartilage called epiglottis which acts as a lid and shuts down the opening of the trachea while food is being swallowed and passing through the oesophagus.

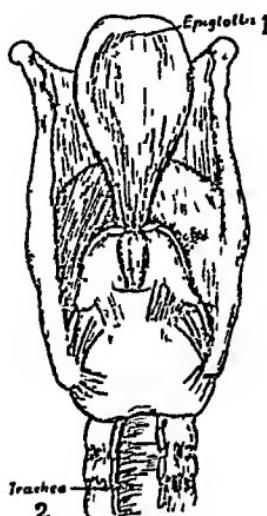


Fig 9

Oesophagus, Epiglottis,
Trachea

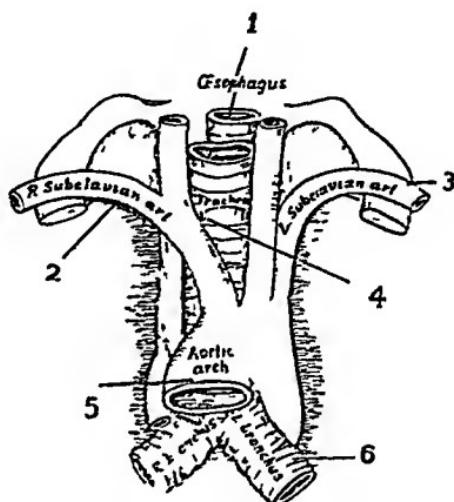


Fig 10

1 Oesophagus, 2 Right Subclavian artery, 3 Left Subclavian artery, 4 Trachea, 5 Aortic arch, 6 Bronchus

The swallowed food passes down into the stomach and thence to the duodenum where the food materials receive from the pancreas and the gall bladder, the digestive secretions of these organs. From the duodenum the semi-digested food material passes down into small intestines and undergoes changes while travelling through its great length. By the time the food materials reach cæcum, most of the absorbable material is absorbed forming blood. The chief

function of the large intestine is to absorb what is left of the useful material and particularly water. The remainder is discharged from the rectum as faeces. As the digestion proceeds the absorbable materials are collected and discharged into the portal veins which carry them to the liver.

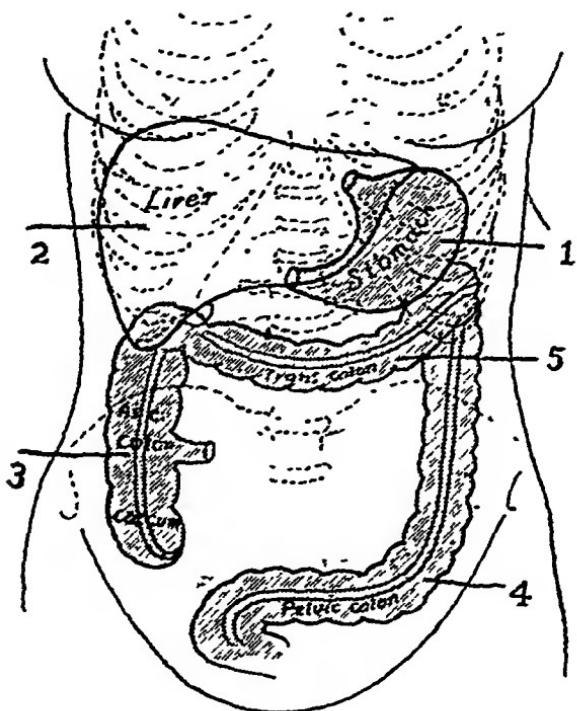


Fig 11.

Front of abdomen

1. Stomach, 2. Liver, 3 Ascending Colon, 4 Pelvic Colon.

Liver is a great workshop in which some of the food materials, in excess of what is required for recouping blood, are stored. When there is shortage of food the stored material from the liver is sent out to make up the necessary ingredient in the blood

Liver also separates some of the non-absorbable excretal matter of blood from the portal veins and sends them back to the kidneys

In the liver bile is manufactured out of the materials supplied by the blood from portal veins. The bile accumulates in a small sack placed on the under surface of liver, called the gall bladder. This bladder injects bile into food as it reaches the duodenum.

In the kidneys extra water or more than its due proportion in the blood, is separated. Urea or excretal

soluble matter is also separated here from blood. These refuse matters are sent out through conduit pipes called ureters to the bladder which is the storage vessel for urine.

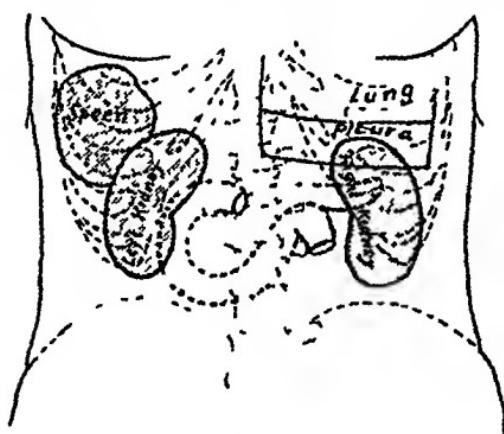


Fig. 12

Back of lumbar region,
showing the kidneys and the spleen.

The spleen is another organ which utilises spent up red corpuscles from blood

and sends them after transformation to the liver through the portal vein. The liver converts these into bile.

The Organs of Head

On the top of the body is placed the head, the bony portion of which is called the skull

Within the casing of the skull is placed the brain. The brain can be divided into the following parts fore brain or cerebrum, hind brain or cerebellum and medulla oblongata connected by a bridge with the fore brain.

The cerebrum is the largest portion of the brain. It is said that the front portion of the brain is the seat of intellect, the side portions of moral sentiments and the hind portion of domestic propensities.

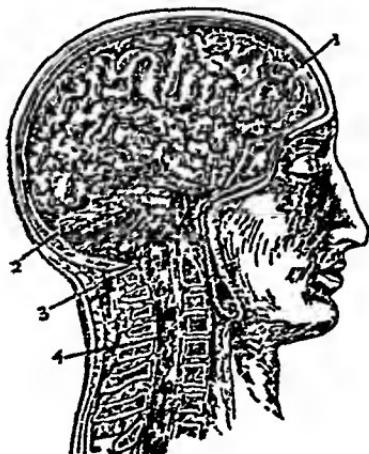


Fig. 18.

Skull showing brain.
1. Cerebrum, 2. Cerebellum,
3. Medulla oblongata,
4. Spinal cord.

The brain matter ends in medulla oblongata which passes through a channel of the bones of the spine and spreads out to different limbs and organs of the body.

The brain is made mostly of nerve cells. By means of them we do all our thinking, feeling and willing. The medulla oblongata is the prime line of cables transmitting messages or sensations from and to the brain.

If a blood vessel in the brain gets ruptured then the man is said to get an apoplectic shock. The portion of the brain affected by the shock gets out of action and according to the region to which the injury has come, the symptoms of paralysis are exhibited. There is a small part of the brain tissue on the left side which regulates speech and if this is injured, the

person is unable to speak although he is capable of eating and performing all other functions. The back part of the brain is concerned with seeing and another portion of the brain presides over some other important functions such as swallowing, breathing etc.

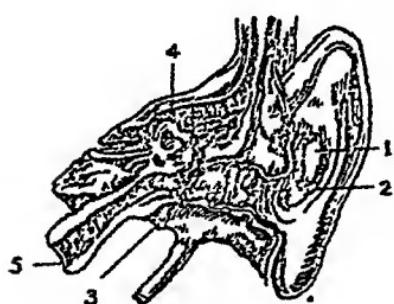


Fig 14 Ear.

1. External ear,
2. External auditory canal,
3. Tympanic membrane,
4. Semi-circular canals,
5. Eustachian tube.

The organs of the ear and the eye are situated in the head. The ear is one of the mechanisms of communication with the outer world. From the commencement of the ear a canal of bone passes and at a certain stage the passage is blocked by a thin wall of membrane called drum. Up to this, is the outer ear. Then there is another

membrane some distance away. This portion is called the middle ear. After this, is the internal ear. In the internal ear is situated a conch shaped structure for receiving sound at the last stage.

From this, the auditory nerves carry the sensation of sound to the brain.

The Eye

The eye consists of cornea which is a transparent curved window receiving rays of light. The space behind it, is filled with a transparent watery fluid.

Next to the cornea is a coloured curtain with a hole in the middle called iris which can automatically

become large or small to receive more or less light. The hole is called the pupil. Behind this is the lens and then comes the hollow of the eye, filled with a vitreous body through which light passes, and strikes the screen or retina behind the eye from where the

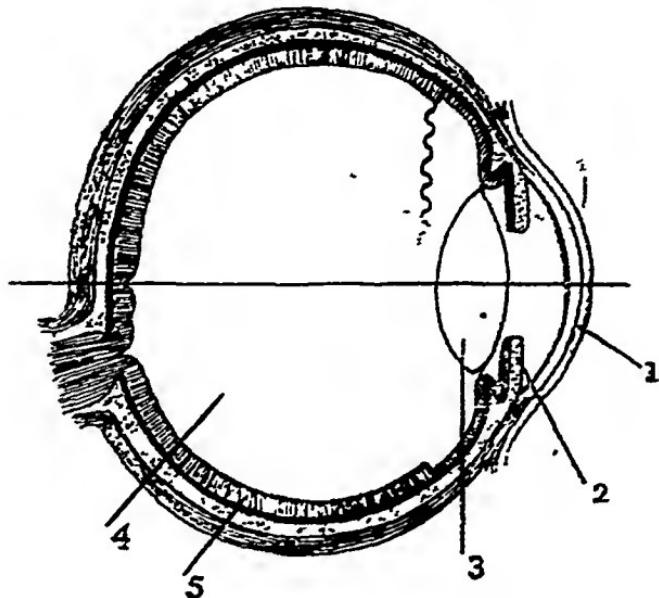


Fig. 15. Eye.

1. Cornea. 2 Iris, 3. Lens, 4. Vitreous humour, 5 Retina.

optic nerve takes the impression of the object seen to the brain

The Nose

The nose serves the purpose of the passage for taking in air into the lungs and of throwing off foul air from the lungs. In the nose there is an arrangement for heating the incoming current of air by contact with thin tissues containing blood vessels. The olfactory nerve, which is the medium of carrying the sense of smell, is situated within the nose.

$$q < \frac{q_0}{\lambda_0}$$

20
20
20

The Mouth

The mouth contains the teeth set in the upper and lower jaws and also the tongue. As parts of the digestive system we shall consider their functions in detail. With the help of the teeth, lips and tongue we not only eat but also speak. The main vocal organ

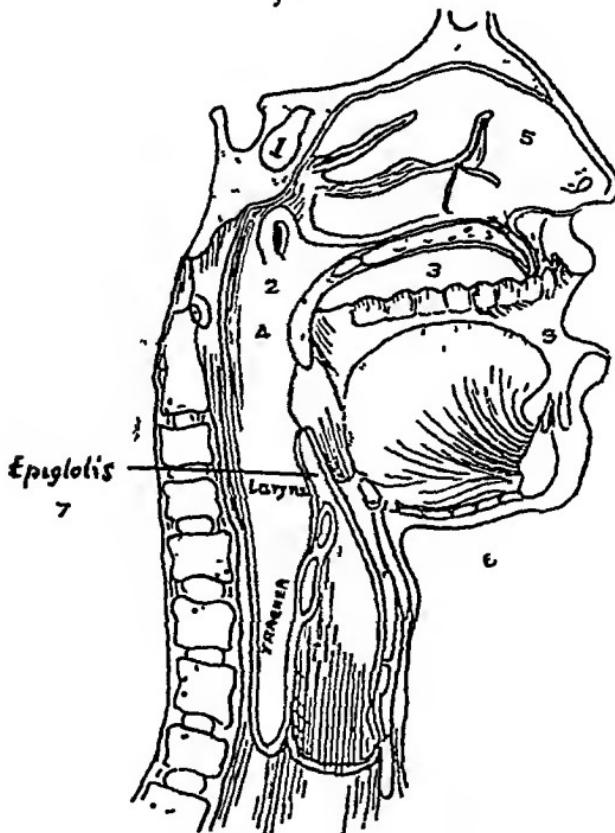


Fig. 16

Section through mouth.

- 1 Sphenoid bone, 2 Eustachian tube, 3 Soft palate. 4 Uvula
- 5 Nasal passage, 6. Lower jaw, 7. Epiglottis, 8 Mouth

is the larynx which sets up the vibrations as we want to speak. The tongue, the palate, teeth and lips all play their parts in bringing out a particular note.

THE SKELETON

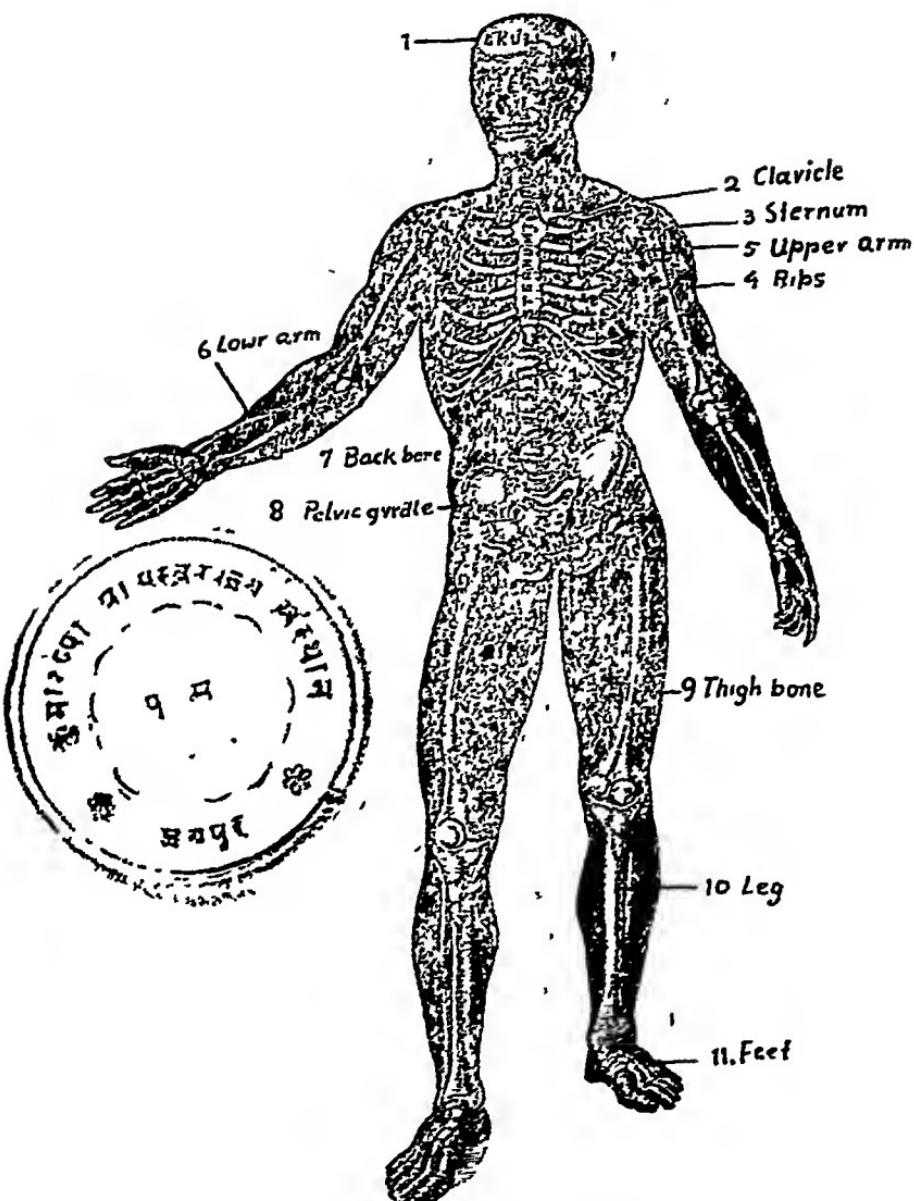


Fig. 17.

1. Skull, 2. Clavicle, 3. Sternum, 4. Ribs, 5. Upper arm, 6. Lower arm. 7. Back bone, 8. Pelvic girdle, 9. Thigh bone, 10. Leg, 11. Feet

Skeleton is the frame of bones which supports the body. Previously we have considered some of the organs and how they perform their functions. These organs have to retain their relative places in order that they may be able to function. The skeleton gives the main support to these organs. If the bones are taken out, the human body becomes an unrecognisable and shapeless mass.

We shall consider here the skeleton which directly or indirectly supports all the organs.

This frame of bones consists of the following —

Back bone or vertebral column	26 pieces
Breast bone and ribs	25 ,,
Bones of the upper limb	64 ,,
Bones of the lower limb	62 ,,
Bones of the head	8 ,,
Bones of the face	14 ,,
Total .	<hr/> 199 pieces

The back bone is a column of bones which runs centrally along the back of the body. The technical name of this column is the vertebral column. Each one of these bones forming the column is called a vertebra. These bones differ in shape but the general structure is the same. Now, taking one of these bones, we find that the front portion is round and smooth while the back portion has three horn like pieces projecting out. The central one projects directly backward, and can be felt from outside along the furrow, midway on the back of the body. The piece of vertebra is solid.

except for the hole which forms a channel for passage of the bundle of nerves known as the spinal cord.

As is seen from the sketch, the vertebral column is divided into several parts for the purpose of study.

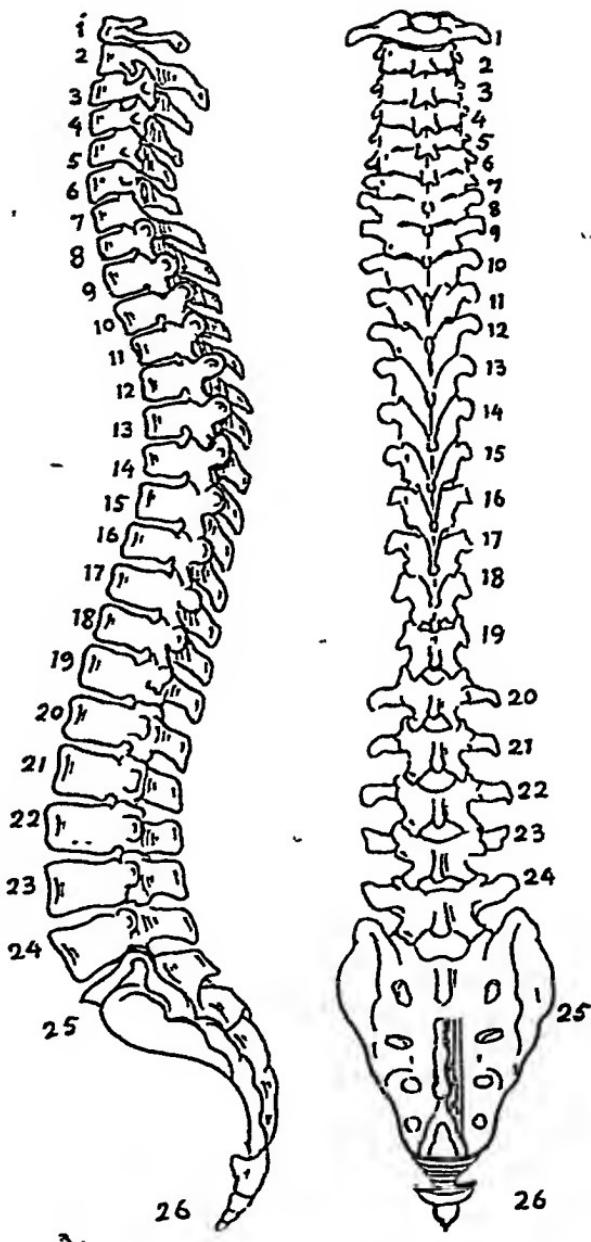
(1) 7 bones are neck bones or cervical vertebrae.

(2) 12 bones are back bones or dorsal vertebrae.

(3) 5 bones are loin bones or lumbar vertebrae.

(4) 1 bone in which 5 bones are joined forming the back of the pelvis is called the sacrum.

(5) 1 bone composed of



Lateral view. Dorsal view.

Fig. 18. Vertebral Column.

1 to 7. Cervical vertebrae, 8 to 19. Dorsal vertebrae, 20 to 24. Lumbar vertebrae, 25. Sacrum, 26. Coccyx.

4 little bones in fusion at the extremity is called the coccyx These form the beginning of tail in lower animals.

We have these 26 pieces of bones in the column As the column approaches its lower end the bones become more massive, but after sacrum it decreases in size The column is not a straight one but is bent from front to back in the form of two waves The

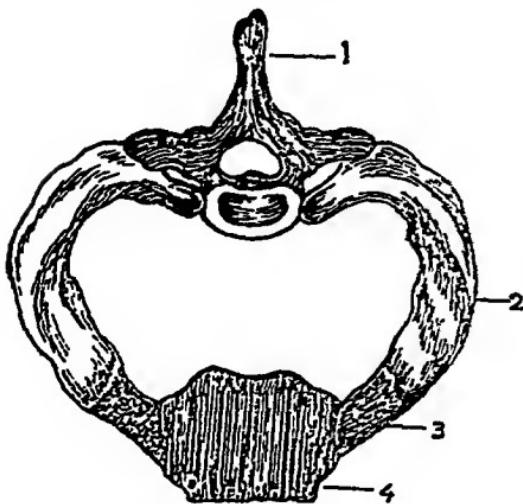


Fig 19 Hoop of back bone, ribs & sternum 1 Back bone, 2 Rib, 3 Cartilage, 4 Sternum.

bones do not lie one over the other directly but there are pads of wax like materials called cartilages interposed. The pieces forming the column are kept in their places by strong bands of connective tissue called ligaments The ligaments are stretched from one piece to next and

beyond All the bones thus joined by ligaments form a canal The spinal cord lies in this hole or canal If the vertebrae be injured, serious trouble, even death may happen

20/90

The first two pieces in the upper end of the vertebral column are called atlas and axis Atlas, because the head sits on it and is supported by it The axis permits the atlas to rotate to some extent on

it and has a pin-like bone standing up and passing through atlas. This is the odontoid peg of axis. If the neck is folded beyond a limit, this peg breaks the muscular partition and strikes against the medulla passing through the hole of the atlas and causes immediate death. The hangman performs this process of breaking the neck and so do animals when they

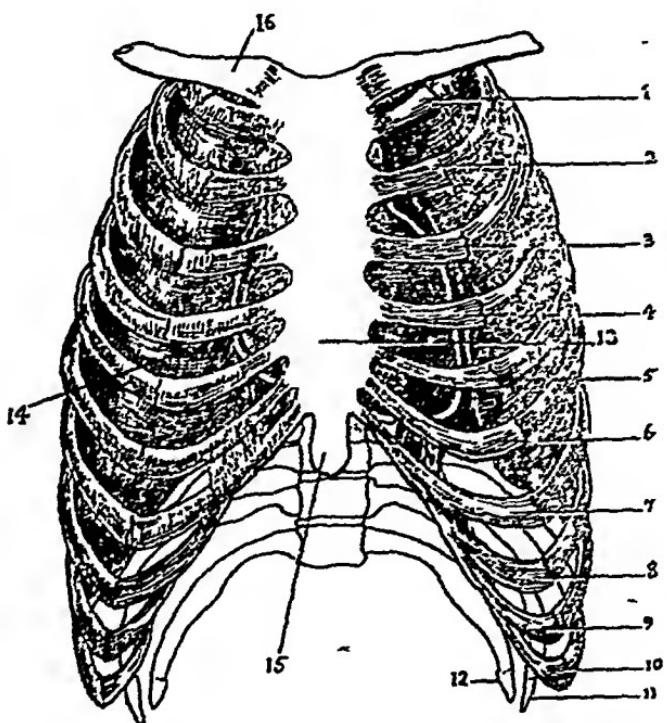


Fig. 20 Sternum & ribs

1—12 Ribs, 15. Sternum.

1 Sternum, 24 Ribs—12 on each side. Total...25 bones.

kill their prey by breaking the neck causing immediate death.

The plate of bone on the breast to which the ribs starting from the backbone are joined in front is called the breast bone or sternum. The sternum can be

felt in a living body It begins just below the depression of the throat and taking up the ribs on both sides, ends in a blunt point where the stomach begins The sternum is shaped like a butcher's knife It is tough and elastic and rarely breaks

The sternum receives the ribs The ribs end in cartilage at their joints with the sternum There are 24 ribs, 12 on each side Of these the first seven pairs of ribs are joined directly to the breast bone The next three pairs join each other and are joined to the seventh rib The last two pairs of ribs are called floating ribs for they are not joined to the breast bone. The joints of ribs with the back bone and the breast bone allow of their moving up and down to some extent If they are raised the chest is expanded and with downward motion the chest collapses This is necessary for the function of breathing

Bones of the Upper Limb

Collar bone 1, Humerus 1, Radius 1, Ulna 1, Scapula 1, Carpal 8, Meta carpal 5, Phalanges 14, 32 on each side Total . 64

The Shoulder and upper arm, the forearm and the hand constitute the upper limb There are two upper limbs Each upper limb consists of one collar bone or clavicle, one upper arm bone or humerus, two forearm bones or ulna and radius and one shoulder blade or scapula which joins with the collar bone by a thick process which can be felt under the skin Scapula is a triangular piece of bone forming the side of the upper portion of our back There is a cavity in it

which fits on the ball of the humerus. This cavity is called the glenoid cavity.

Collar Bone. It is a piece of thick long bone. At one end it joins with the breast bone or sternum and by the other end it is connected with the shoulder blade. The collar bone is very liable to break by falls from a height.

Humerus. It is a long thick bone with cylindrical body. The upper end is ball shaped and fits into the glenoid cavity of the shoulder blade.

This ball and socket joint permits the arm to be moved almost freely in any direction. Sometimes the tension at the joint may be too great for the binding ligaments to keep the two pieces together, then we have the dislocation of the shoulder joint which may be put right by bringing the head of the humerus within the cup.

One of the two forearm bones is called spokes-bone or radius. It is joined with the wrist bones and permits

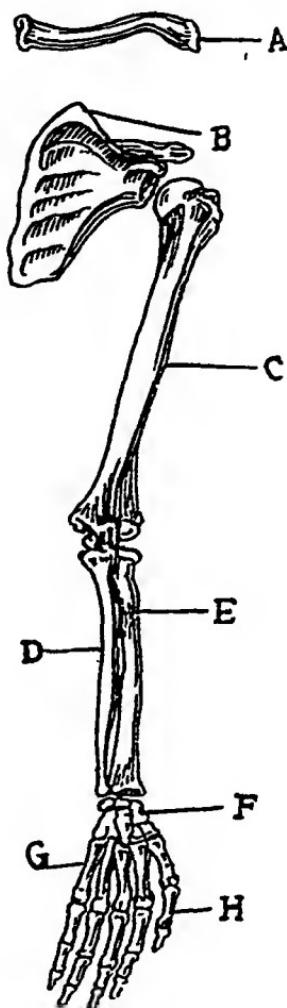


Fig. 21. Upper Limb.
 A. Collar bone 1, B. Scapula 1, C. Humerus 1, D. Ulna 1, E. Radius 1, F. Carpal bones 8, G. Meta-carpals 5, H. Phalanges 14. Total. 32 bones.

of the radiation or turning round of the wrist
The upper end is a shallow cup fitting with the lower end of the humerus

The other bone of the forearm is the elbow bone or ulna. It is the larger of the two bones and lies to the inner side of the forearm. Its upper end is attached to the humerus by a sort of hinge. It cannot therefore be bent backwards. When the radius bone rotates turning the wrist, the elbow bone remains stationary.

The eight carpal or wrist bones are arranged in two rows. The upper row is connected with radius and ulna. The lower row is connected with the five palm or meta-carpal bones. They look like fingers but are not so. They form the bony structure of the palm.

There are three finger bones (phalanges) for each of the four fingers. The thumb has only two bones. In all, there are 14 finger bones. The finger bones enable the grasping and other motions of the fingers.

Bones of the Lower Limb

The pelvic girdle	1 bone
Thigh bone or femur	1 ,,
Knee-cap or patella	1 ,,
Shin bone or tibia .	1 ,,
Buckle bone or fibula	1 ,,
Ankle bone or tarsus	7bones
Instep bone or meta tarsus	5 ,,
Phalanges or toe bones...14	,,

Total . 31 bones on each side.

The arrangement and number of bones of the leg bear remarkable similarity to the bones of the arms. As the arms are fastened to the upper part of the body through the shoulder blades and the collar bones or the shoulder girdle, the legs are connected with the vertebral column at the lower part of the body through the pelvic girdle.

The pelvic girdle to which the thigh bones are articulated, is a strong arch springing from the sacrum. It is formed by large irregular bones. The sacrum is firmly wedged in between the two hip bones which give attachment to the large muscles of the buttock. The cavity of the pelvic girdle is called the pelvic cavity.

Bones of the Head

The skull consists of cranium or brain case and face bones. The cranium or brain case is composed of eight bones firmly fixed together.

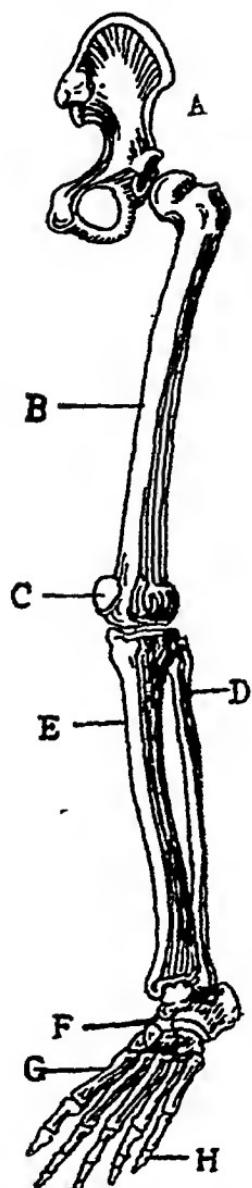


Fig. 22. Lower Limb
 A. Pelvic girdle, B Femur, C Knee cap
 D. Buckle bone or Fibula, E. Shin bone or Tibia, F Tarsus (7 bones), G Metatarsus (5 bones) H Phalanges.

- 1 Occipital bone
 - 2 Parietal bones
 - 1 Frontal bone
 - 2 Temporal bones
 - 1 Sphenoid or wing bone
 - 1 Ethmoid or sieve like bone
-
- 8 bones



Fig 23
View of head

The occipital bone forms the back of the skull as also its under surface where there is an $1\frac{1}{2}$ inch hole for the oblong marrow, (medulla oblongata) to pass

The two parietal bones form the two sides and the roof of the cranium

The frontal bone forms the forehead and a part of the sockets of the eye balls

The sphenoid (wing bone) is placed just behind the eye balls and forms the sockets of eye and connects the different bones of the skull

The temporal or temple bones have the opening of the ear Ethmoid bone is situated at the base of the nose It has got many holes through which nerves enter the nose.

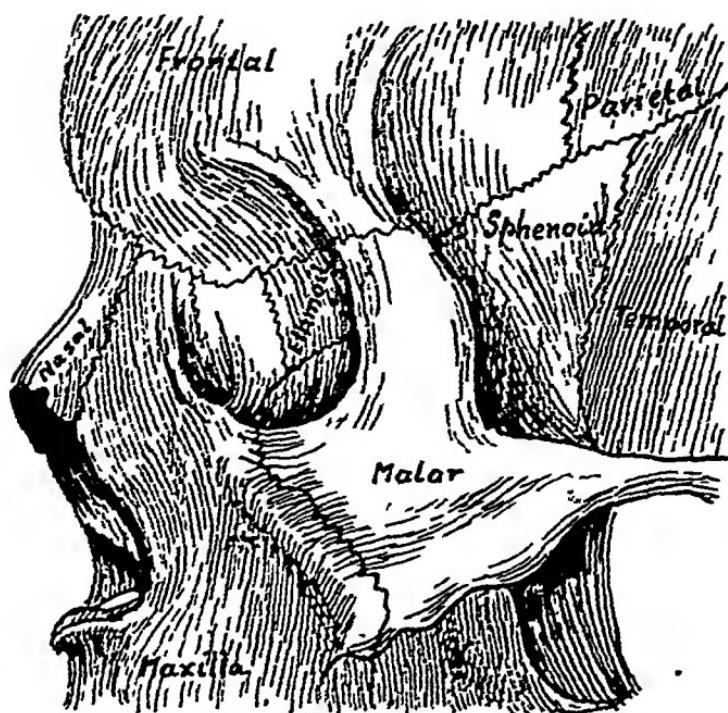


Fig 24 Bones of the skull and face.

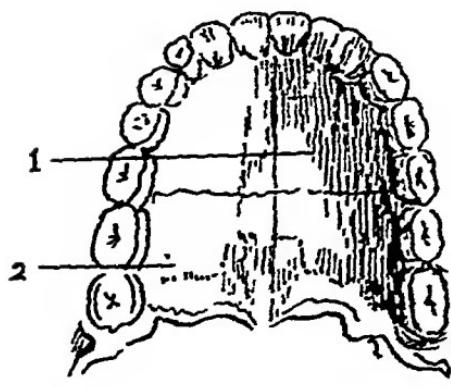


Fig 25.
Palate bones.
1 Hard palate, 2 Soft palate

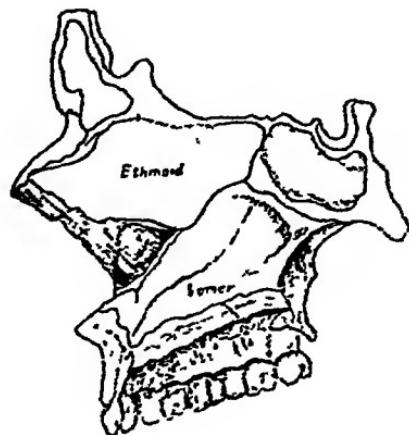


Fig 26.
Section through nose
showing vomer.

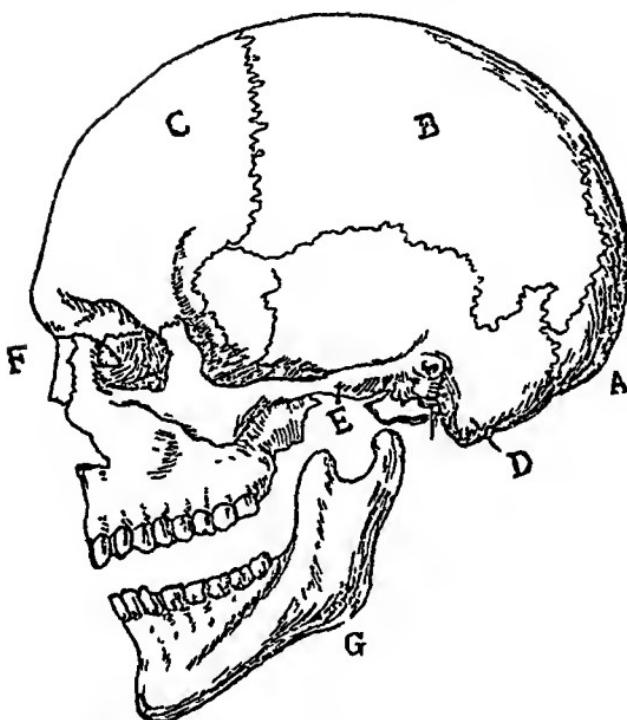


Fig 27. The skull and face

A Occipital 1, B. Parietal 2, C. Frontal 1, D. Temporal 2,
E Sphenoid, F Ethmoid, G Mandible

Bones of the Face

There are 14 bones in the Face —

Nasal	.	2
Lachrymal (Teal)		2
Malar (Cheek)		2
Palate	.	2
Maxilla (Upper Jaw)		2
Mandible (Lower Jaw)	.	1
Vomer (Plough share)	.	1
Inferior turbinated (Scroll like)		2

Total 14 Bones

The nasal bones are two pieces which form the bony portion of the nose.

The lachrymal (tear) bone can be felt by pressing deeply on the inner side of the eyes. It contains grooves for the ducts carrying tear from the eyes to the nose.

The malar or cheek bones form the prominence of the cheek as well as the outer walls of the sockets of the eyes.

The maxillæ or upper jaw bones unite in front leaving a gap for the opening of the nose. These hold the sockets of the upper teeth.

The palate bones are placed behind the upper jaw bones at the roof of the mouth. They separate the cavity of the mouth from the cavity of the nose.

The mandible or lower jaw bone resembles a horse shoe and holds the sockets for the lower teeth.

The vomer (plough-share) is so called because it looks like a plough-share. It is a thin plate dividing the nasal cavity into two parts.

The inferior turbinated bones are placed behind the nose. Their purpose is to expose the air entering the lungs to a greater surface of capillaries and thereby warm it successfully.

We have now enumerated and located all the bones of the body. In our enumeration 199 bones are listed. The sacrum (pelvic) and coccyx (tail) bones are counted as two bones but in reality they are congl-

meration of 5 and 4 bones each, which set to form single bones If they are counted as 9 bones then the total number of bones comes upto 206 which is the number usually spoken of Besides these there are 3 small bones in each middle ear

Composition of Bone

The whole human body is formed by the multiplication from a single cell Various organs and parts of body also consist of cells The bones therefore must be composed of cells and so they are Bones are covered except at their joints with a membrane called periosteum At most of the joints they are covered with cartilages Periosteum is rich in blood vessels From this, minute blood vessels pass on to the bone itself through numerous minute holes in the bone. If the bone is cut across it will be found to be hollow inside This cavity contains the marrow or medulla —a reddish tissue containing much fat

Along the length of the bone there are minute canals parallel to the medullary cavity The bones are developed and nourished by cells arranged around these minute canals The ends of the bones are not hollow but are spongy and as strong as the shaft itself Some bones are wholly spongy within, such as the ribs and the vertebræ. The spongy structure holds materials similar to what are found in the cavity of the hollow portions

The bones contain mineral matters consisting of phosphates and carbonates If the bones are treated

with acid much of the mineral matters are reacted upon and changed making the bones soft.

When bone is burnt, organic matters burn away leaving a white mass of ashes of mineral matter which retains the shape of the bone but crumbles readily to dust. This bone-ash is two-thirds of the weight of dry bone. Bone ash consists mainly of phosphate and oxide of calcium.

THE MUSCLES AND JOINTS

The Muscles

The chief use of the muscles is to cause movement of the body. The muscles are our direct agents performing various works for us. The muscles are of two kinds, voluntary and involuntary. Voluntary muscles are those which obey our will and involuntary muscles are those over which we have no control. We may raise or lower our hands at will. The muscles of the hands obey our will. But we cannot

make the heart or lungs or the stomach act as we may like to direct. The heart and the stomach are made of involuntary muscles. The muscles of respiration are both voluntary and involuntary.

The voluntary muscles are

attached to bones and look striated or striped when seen through a microscope. The heart muscles though involuntary are also striated.

These striated muscles are generally built up of very thin threads or fibres (fibrillæ). Some of those are covered and bound together by a thin connective

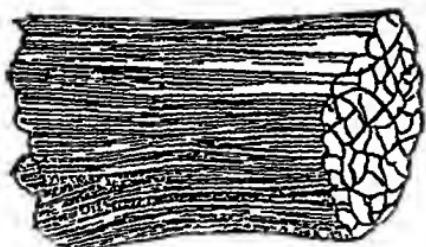


Fig 28 Striated Muscles

tissue which carries the arteries, veins and the capillaries and also the nerves. These striated muscles can contract or expand and are provided with nucleus cells. A bundle of them is covered again with a fine sheath called sarcolemma. The unstriated muscles are of much shorter units and are made by the muscular cells placed end to end from which fibres come out binding them across. Although these muscles are beyond our control, still they are affected sympathetically by outside influences.

The striped muscles are saturated with a thick semifluid substance which can be squeezed out of living muscles and are called muscle plasma. Outside the body, this fluid clots like blood and is found to contain a substance called myosin. This substance on the death of the muscle, becomes hard and it is therefore that the body becomes stiff after death. This condition is called rigor mortis. After some time again decomposition sets in and the muscles become soft, the stiffness of the body goes away.

The muscles' ends are attached to the bones by ligaments. Tendons are narrow strong white glistening fibres and look like strong jute ropes which form the terminals of muscles before they end in a ligament attachment with the bone.



Fig. 29

The muscle of the heart both striated and Non-striated.
A Nucleus.

Some Important Muscles of the Body

Deltoid is the muscle which forms the outer side of our shoulder and gives it a rounded outline It is a strong and thick muscle When this muscle contracts, the arm is raised in a line with the shoulder The muscle of the chest is called **pectoralis major** This muscle is connected with flat tendon attached to humerus **Rectus abdominis** is a long flat muscle extending along the whole length of the abdomen

Muscles may be classified according to their functions A **flexor** is a bending muscle which bends the limbs For example a flexor biceps pulls the forearm to the shoulder

An **extensor** is a straightening muscle which extends or strengthens the limbs The triceps is an extensor, extending the arm.

An **adductor** draws two parts together such as the one bringing the upper arm close to the trunk

The extensor muscles of the arm lie on the outer and posterior sides of the upper arm and the flexor muscles on the inner and front sides The muscles of the inner side do the bending of the hand and fingers, those of the outer side extend and strengthen them The functions of the muscles of the lower limbs are also similar

When we fold our arm it is the **biceps** which contracts The biceps is attached to the ball of the humerus at one end It is swelled at the middle and the other end is connected to radius, an inch below

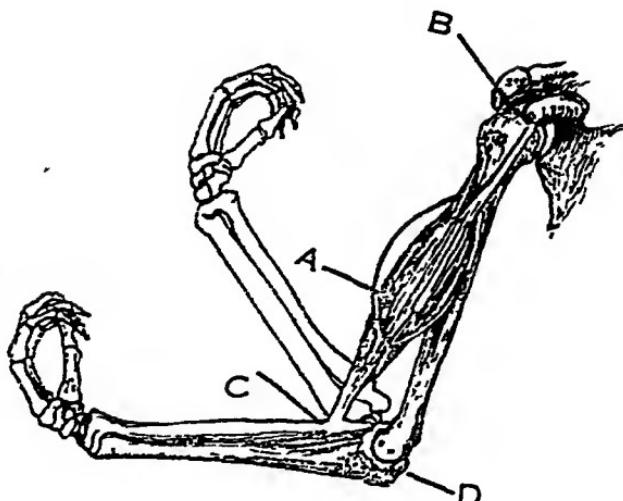


Fig. 80. Action of the muscles of the arm
 A. Biceps, B & C. Tendons attaching the muscle,
 D. Elbow joint.

the elbow. When the biceps contracts, the forearm is raised. For bringing the arm to an extended position, the triceps is contracted and the biceps relaxed.

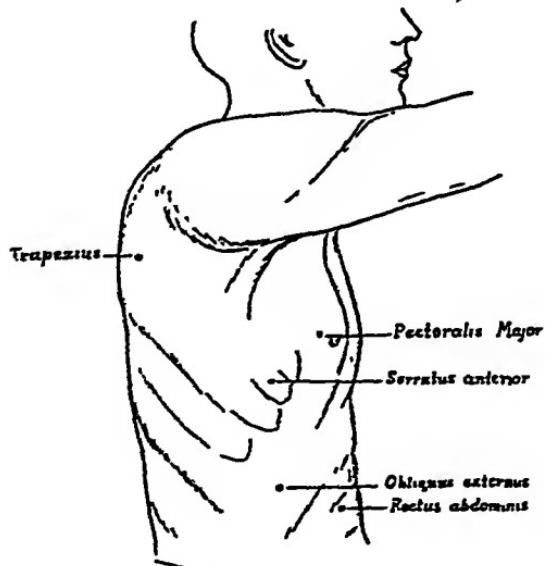


Fig. 81. Side of the thorax,
 showing position of various muscles.

The most important muscle of the forearm is the *palmaris longus*. This operates the palm of the hand. It is a narrow muscle fixed to the end of the humerus and passing along the inner side of the

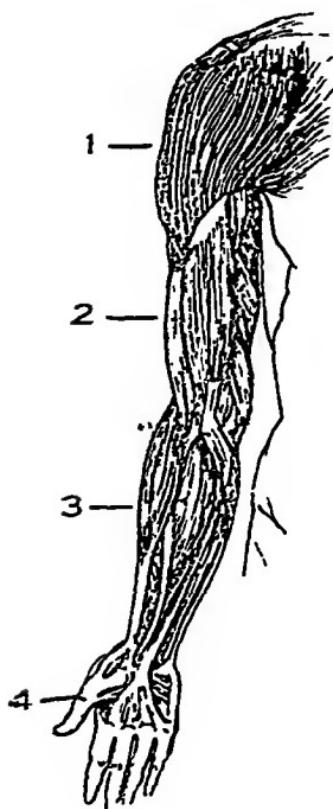


Fig 32

Muscles of the arm and forearm

- 1 Deltoid, 2 Biceps
brachii, 3 Brachio—
radialis, 4 Palmaris
longus.

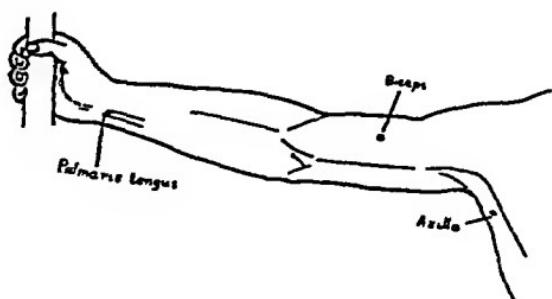


Fig 33
Front of the arm and forearm

forearm, comes inward and crosses into the palm of the hand at about the centre of the wrist

At the base of the hand at the junction of the wrist, there is tape like ligament called annular ligament. The palmaris longus passes under the tape and ends in a sheath of the muscles of the palm called palmaris fascia

The sartorius is the longest muscle in the body. It is

flat, narrow and ribbon like. It originates from the upper part of os innominatum which is a part of the pelvic girdle and extends to the inner side of the leg.

Quadriceps femoris is composed of four muscles which cover the front and sides of the thigh and these are united into a single tendon which ends in the patella. This is principally used for straightening the leg.

The hip prominence is made by what are known as gluteal muscles. These are three in number and there are others all round the buttocks. They serve

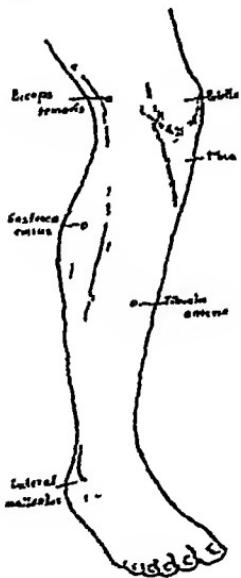


Fig. 84.
Lateral view of the leg.
showing position of muscles.

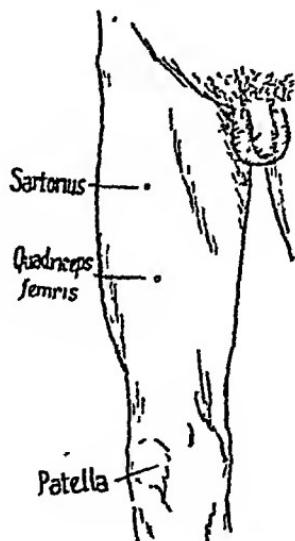


Fig. 85.
Front of the thigh,
showing position of muscles.

to move the thigh and in conjunction with other back muscles help to hold the body erect

The hamstring muscles cover the back of the thigh and acts in opposition to quadriceps femoris.

The most important muscle of the thigh which serves to flex the knee is the biceps femoris

The gastrocnemius and soleus muscles form the prominence of the calf. These muscles unite into the strongest tendon of the body, the tendon of Achillis which ends in the heel bone, *os calcis*

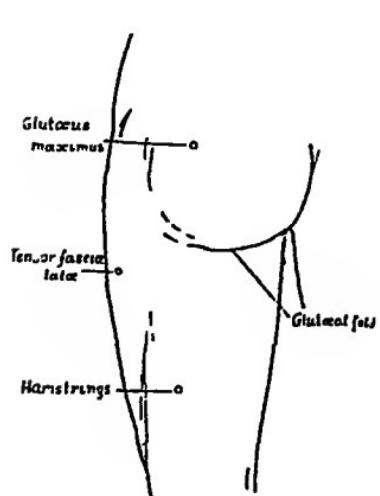


Fig 86
Some muscles of the buttocks
and thigh

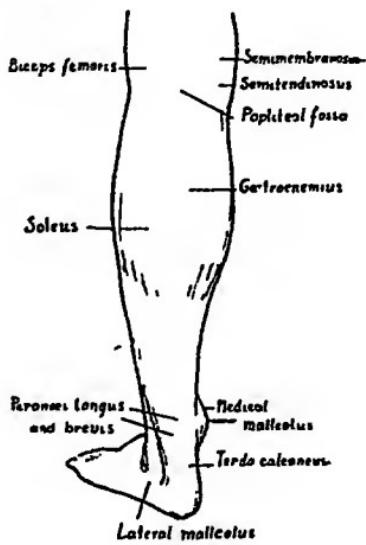


Fig 87
Some muscles of the
back of the leg

JOINTS

The bones are joined to each other by muscles, tendons and ligaments. Joints are movable and immovable. Immovable joints are in the skull where the bones are immovably interlocked with each other. Movable joints are of four kinds (1) gliding joint allowing a slight amount of movement such as the joint of vertebrae. One piece is put over another piece within a thin lubricated disc of cartilage allowing slight movement (2) Hinge joint allowing backward and forward movement as in elbow, knee, fingers, toes and ankle (3) Ball and socket joint

allowing movement in all directions as between scapula and humerus and also in hip joint (4) Pivot joint allowing movement of rotation only, as atlas on axis or radius on ulna.

Hip Joint

The femur has a large ball on its head connected by a neck to the shaft. This fits into a deep cup-like socket in the hip bone. Generally, when the ends of bones meet they are bound together by ligaments of fibrous tissue in the form of strong bands. One of the ligaments is thin and forms a bag round the cavity of the bones. This bag entirely encloses the bone and is called the capsule of the joint. The ends of the bones which meet inside the capsule are tipped with a thin layer of cartilage covered with a thin transparent membrane. It is moist with a fluid called the synovial fluid which makes easy movement possible.

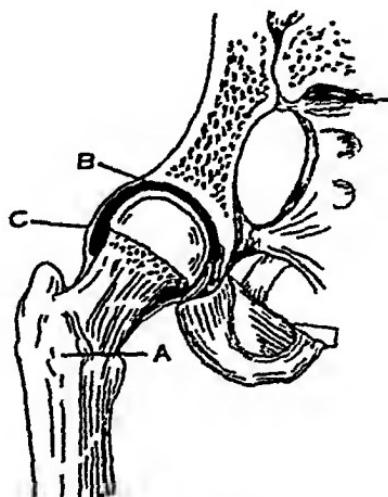


Fig. 38. Hip Joint.
A. Femur, B. Socket,
C. Capsule.

Knee Joint

The knee joint is a hinge joint between femur and tibia. The fibula which runs alongside the tibia takes no part in the joint. The upper part of

tibia is broad and flat having two depressions and round the edges of these, there are cartilages which make depressions deeper. The lower end of femur is shaped to fit into the depressions of the tibia. The tibia is joined to the femur by two cross ligaments. There is also a capsular ligament enclosing the joint which is strengthened by a rounded triangular bone called the knee cap or patella. The tendon of the muscle which straightens the leg or the extensor

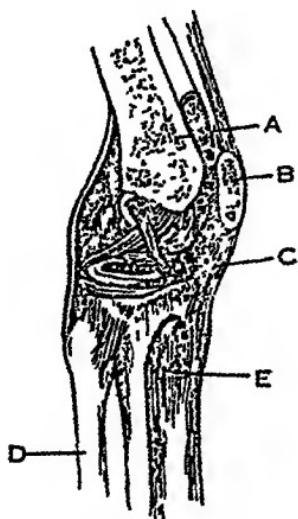


Fig. 39 Knee Joint
 A. Femur, B. Patella,
 C Capsule, D Fibula,
 E Tibia

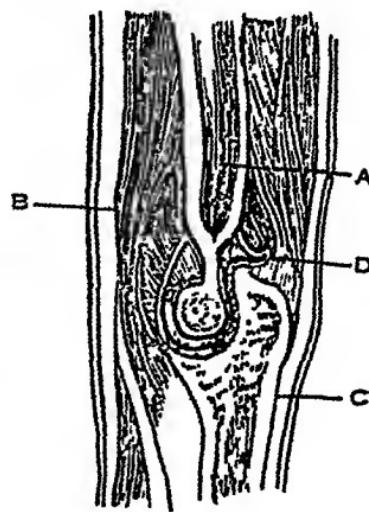


Fig. 40
 Elbow Joint
 A Humerus, B. Biceps,
 C Ulna. D. Capsule

muscle is also attached to the upper end of the patella. This is connected by a ligament below with the tibia

Elbow Joint

The elbow joint is a hinge joint between humerus above and ulna and radius below. The upper end of the ulna forms the bony prominence at the elbow.

At the upper end of the ulna on its front surface is a large deep smooth notch. Into this notch, the rounded lower end of the humerus fits. The radius articulates with a portion of the humerus. The movement at the elbow consists of flexion and extension only. The joint is enclosed by capsular and banded ligaments.

Between ulna and radius is a pivot joint. The radius can rotate round the ulna allowing of the supination and pronation or straight or reverse position of the hand. When the palm of the hand looks upwards the two bones of the forearm lie parallel to each other. The radius is then on the outer side of the ulna. When the hand is turned the radius rotates lengthwise, its lower end moves across the front to the other side of the lower end of the ulna, describing a complete half circle. The radius now lies obliquely across the front of ulna from the outer side at the elbow to inner side at the wrist. This is called pronation. and its reverse i.e. the palm looking upwards is called supination.

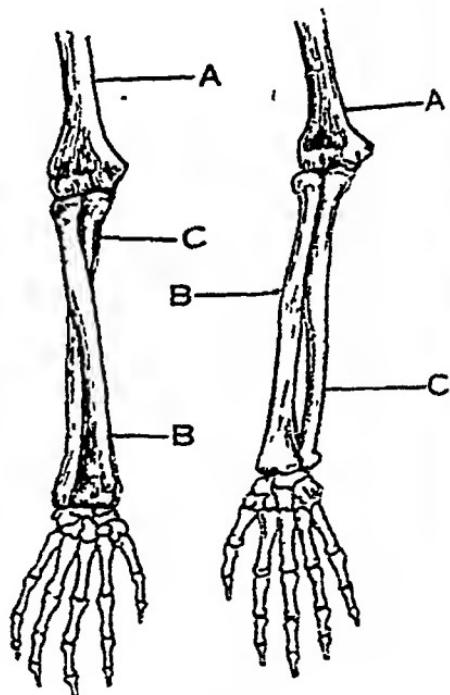


Fig. 41
Wrist Joint
Pronation. Supination
A. Humerus, B Radius, C. Ulna

Wrist Joint

The movement of the wrist takes place between the radius and the carpal bones, between carpal and meta carpal bones and between the carpal bones themselves. These bones are kept in their places by a large number of ligaments.

The joints between the fingers and the hand are all ball and socket joints. The joints in the fingers are hinge joints.

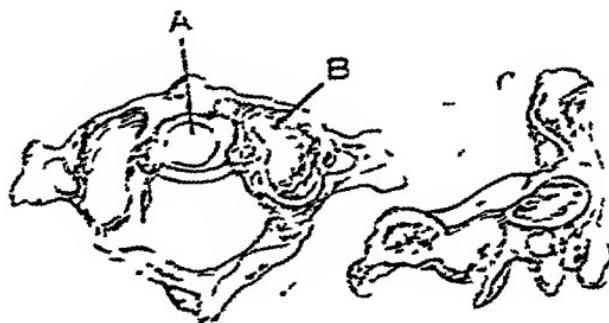


Fig. 42. Atlas.

Fig. 43. Axis

A. Canal of the first cervical vertebra through which C passes, B. Channel for the spinal cord.
C. Odontoid process

Neck Joint

The skull sits on the atlas or the first cervical vertebra. The skull rotates with the atlas. This is accompanied by a pivoted joint between atlas and its seat, the axis or second cervical vertebra. The axis carries a peg called odontoid process which passes through the atlas and round which the atlas with the skull rotates.

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29-40

CIRCULATORY SYSTEM

The Heart

Heart is the central organ of the circulatory system. It is encased in a smooth bag called pericardium,

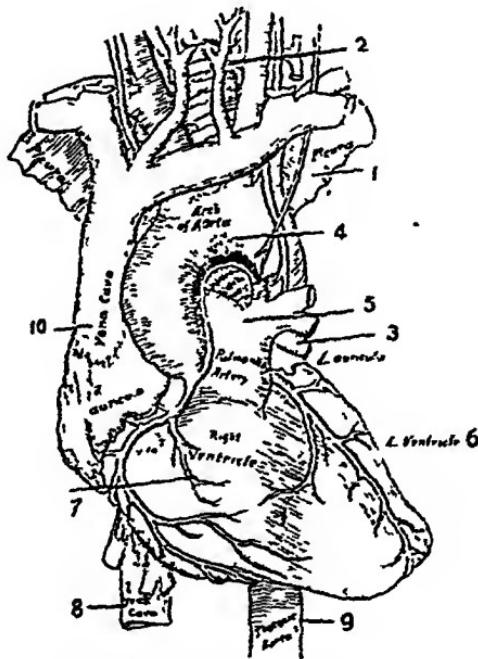


Fig 44. The heart and its great blood vessels.

1. Pleura, 2. Trachea, 3 Left auricle, 4. Arch of aorta, 5 Pulmonary artery, 6. Left ventricle, 7. Right ventricle. 8. Inferior vena cava, 9. Thoracic aorta, 10. Superior vena cava.

which is attached to the heart at its base where the blood vessels enter.

The heart is a wonderfully powerful pump. Unlike many pumps it has no piston. The muscles of the heart relax forming a cavity in which blood flows. As soon as it is filled, the muscles of the heart contract, the walls of the cavity collapse and blood in it is squeezed out. By a proper arrangement of the chambers and valves, complete operation of circulation is maintained.

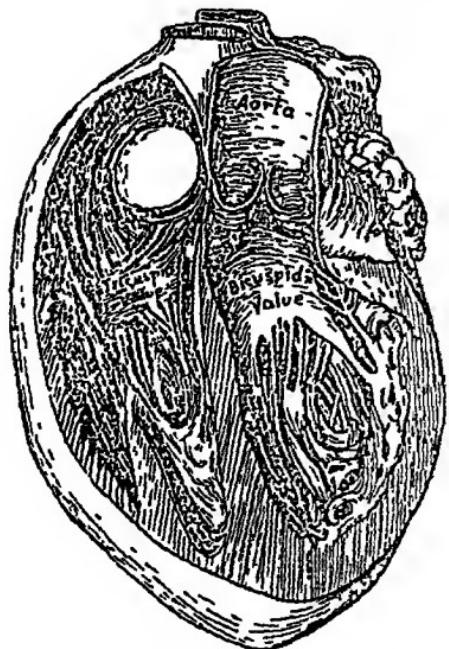


Fig 45. Section of the heart, showing tricuspid and bicuspid valves

Each chamber of heart is therefore sub-divided into two chambers one for receiving and the other for forcing. The receiving chambers are called auricles and the forcing chambers are called ventricles.

That chamber of the heart which is put on the right side of the human body is called the right and

the other one left. Thus we have the right auricle for receiving worked up blood from the veins and the right ventricle for forcing down that blood into the lungs. Then we have the left auricle for receiving pulmonary blood or purified blood from the lungs and the left ventricle, the strongest and most powerfully built force pump chamber, for forcing out the blood into the blood vessels of the body. The receiving chambers of the heart where the blood vessels enter, have got ear-shaped portions to which pipes are attached. These chambers are therefore named the auricles.

The main pipes through which return blood enters the right auricle are called *venæ cavæ*. There are two of them connected directly with the right auricle, the one coming from the upper organs is

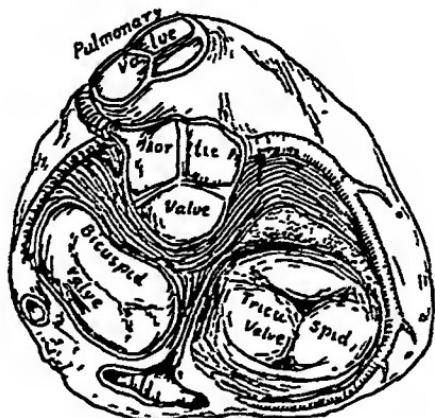


Fig. 46. Base of ventricles, showing aortic, bicuspid and tricuspid valves

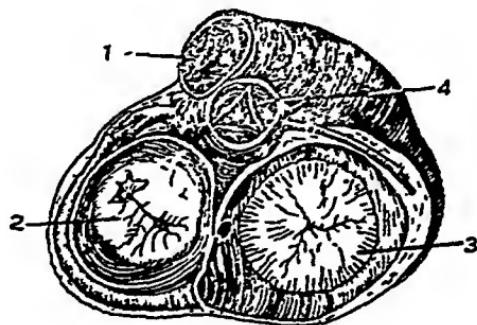


Fig. 47. Section of the heart through the auricles.

1. Pulmonary valves, 2. Bicuspid (mitral) valves, 3. Tricuspid valves.
4. Aortic valves.

called the superior and the other coming from the lower organs is called the inferior vena cava.

The passage through which blood is forced from the right ventricle to the lungs is called the pulmonary artery. The passages through which purified blood enters the left auricle are called the pulmonary veins, and the main blood vessel through which the blood is forced from the left ventricle is called the aorta. It

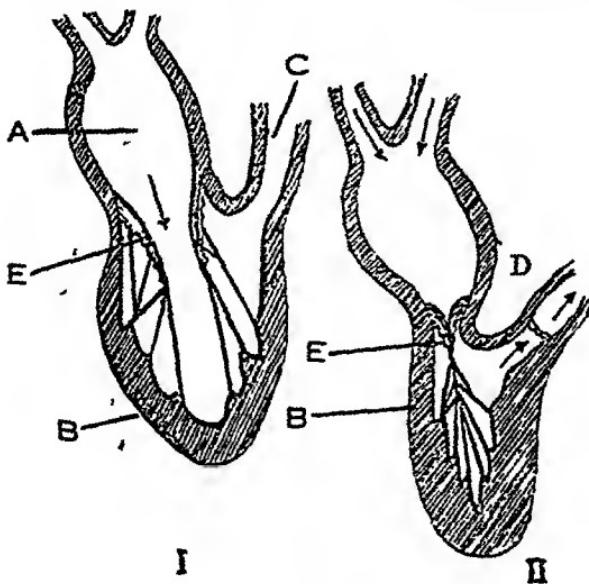


Fig 48 Working of the heart.

I Mitral valves open, blood flowing into ventricle, II. Blood squeezed out of ventricle, mitral closed and semilunar valves open. A. Auricle, B. Ventricle, C. Aorta, D. Semilunar valves, E. Mitral valves

rises up and gives off two branches and then turns down in a sharp curve and passes on giving out branches which are called arteries to the lower part of the body.

Any pumping mechanism must have valves. And so the heart has also got them. These valves are

made of strong membranes and are in the shape of pockets which permit the passage of blood in one direction only. There is no communication between the right and left portions of the heart, the two being quite separate, although their relaxation and contraction take place together.

A diagrammatic representation as shown above will help the understanding of the operations of the valves at suction and force.

Figure 48—I shows the position when the valves of the auricle open into the ventricle. The mitral valves of the left side of the heart between the auricle and the ventricle open allowing free passage of blood into the left ventricle. The exit to the aorta is closed by valves which are called aortic semilunar valves.

In figure 48—II, the left ventricle being filled, it begins to contract and immediately the bicuspid or mitral valves close down shutting communication between the left auricle and ventricle, and the three semilunar valves between left ventricle and aorta open up allowing blood to be rushed past. The contraction of the left ventricle continues till the last drop of blood

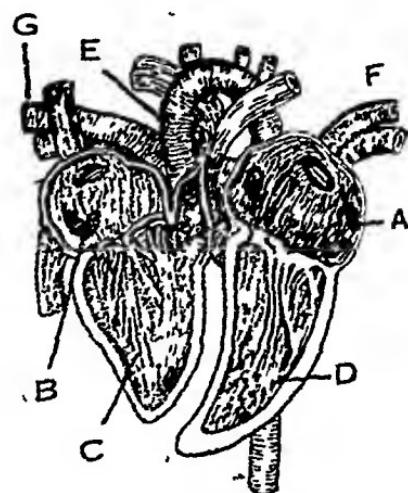


Fig. 49.
Diagram of heart in section
A. Left auricle, B. Right auricle.
C. Right ventricle, D. Left ventricle. E Aorta, F. Pulmonary vein, G. Subclavian artery.

in the ventricle is forced out. While this forcing action is taking place on the ventricle, the auricle also has begun to fill itself from the supplies of blood from the pulmonary veins coming out of the lungs.

We have mentioned about the valves of the heart. We shall now know their position and construction more thoroughly by examining a section of the heart.

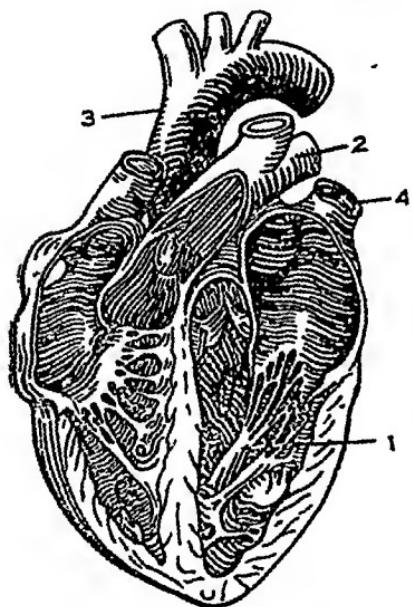


Fig. 50 Longitudinal section of the heart.

1. Left ventricle,
2. Pulmonary artery,
3. Arch of aorta,
4. Pulmonary vein.

The flaps of the valves are tied to white cords passing from them to little projections or columns on the walls of the ventricle. The walls of the veins are thin and soft so that when the blood is not flowing they collapse. The walls of aorta and arteries are on the contrary, strong and stiff and do not collapse.

The heart is a conical body, its apex lies close to the chest wall. With each beat of the heart

the apex is suddenly pressed against the chest wall. The striking of the chest wall by the apex is called cardiac impulse. It is easily felt by the finger if placed on the chest between the fifth and the sixth rib.

When the ear is put against the chest where the cardiac impulse is felt, two sounds are heard. The first one is dull and relatively long and the second short and sharp. The two sounds succeed

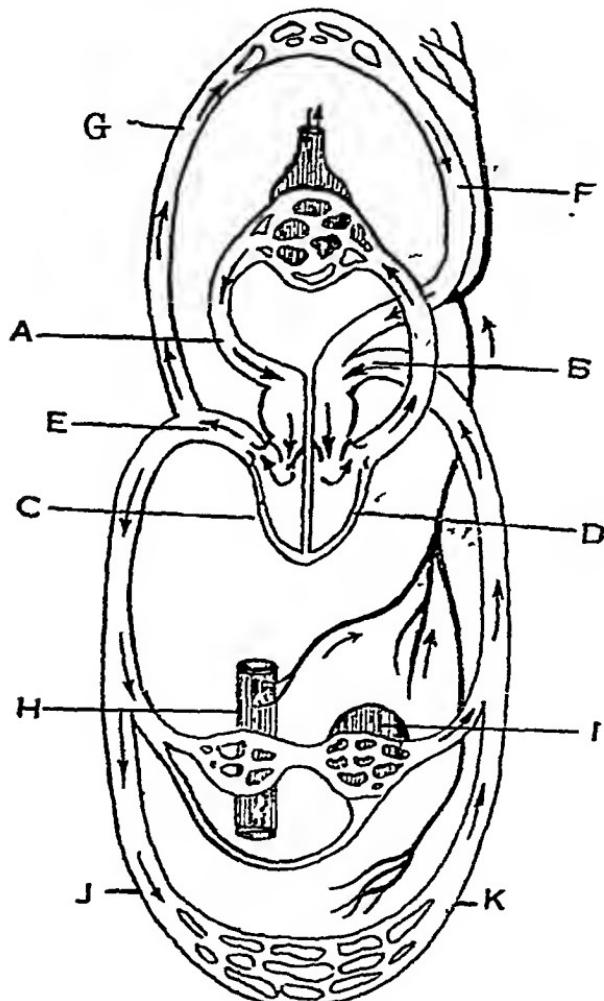


Fig. 51.
Diagram of the Circulation of the blood

- A. Left auricle, B. Right auricle, C. Left ventricle, D. Right ventricle, E. Aorta, F. Superior vena cava, G. Arteries of upper body, H. Alimentary canal, I. Liver, J. Arteries to lower body, K. Inferior vena cava.

each other very rapidly and are followed by a longer but brief pause. The two sounds are likened to 'lub', 'dup'. The first long sound 'lub' occurs when the ventricles are contracting and is caused by the

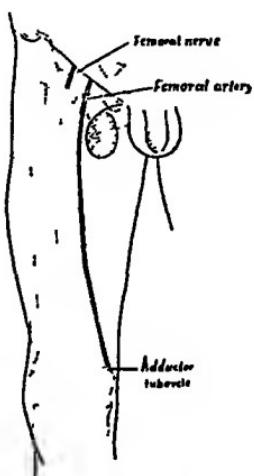


Fig. 52
Front of the thigh,
showing femer,
femoral artery
and femoral
nerve



Fig. 53
Lateral view of the
leg, showing bones,
anterior tibial
artery and deep
peroneal nerve

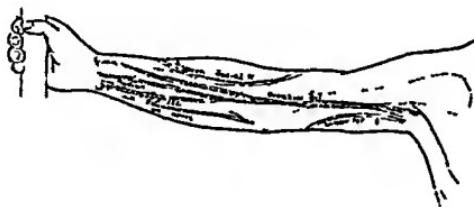


Fig. 54
Front of the arm and forearm, showing
bones, arteries and nerves

rumbling of the muscular tissue and by the vibrations of the mitral and tricuspid valves set up by pressure on them. The second 'dup' is caused by the semilunar

valves of the aorta and pulmonary artery being thrown into vibrations at their sudden closure.

The arteries are force pipes through which flows the red arterial blood. The blood flows to some purpose through the arteries. The purpose is to keep alive and make up for the waste done by work to that part. This, the blood does, by going through the arteries into innumerable net work of capillary conduit pipes. The pipes practically cover the entire human body. They allow blood to pass from them to another set of capillaries—the beginnings of veins. Blood goes to capillary ends of arteries, performs work by being forced through the return channels or the veins. The veins from the right and left arm, are right and left subclavian veins. The veins of the head and neck unite to form the external jugular veins. The large veins of the upper body all unite to form the superior vena cava. The large veins from legs unite to form the inferior vena cava which does not come back directly to heart but circulates in the abdominal region performing important functions in the digestive and excretory systems. The veins from the kidneys and another vein just near the diaphragm called the hepatic vein from the liver, pour blood into the inferior vena cava. The veins from all the other abdominal organs, the stomach, the small and large intestines, the spleen, the pancreas etc. unite to form the portal vein. The portal vein goes to liver not to drain it but to meet in the capillaries the red blood from aorta. There it performs many wonderful processes and comes out by

what is known as the hepatic vein to pour into the inferior vena cava. Venous blood from the abdomen therefore performs some functions in a second set of capillaries before return to the heart.

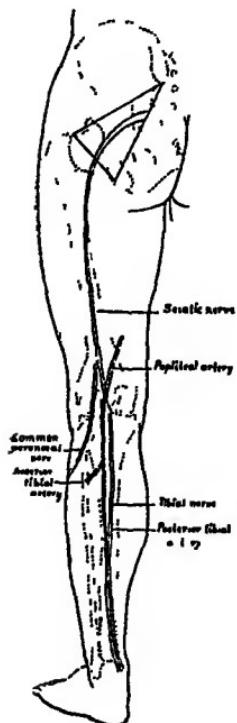


Fig 55

Back of the thigh and leg, showing bones, popliteal artery, anterior and posterior tibial arteries, sciatic nerve and common peroneal and tibial nerves.

This pressure is called the blood pressure. With each beat of the heart, a fresh quantity of blood is thrown

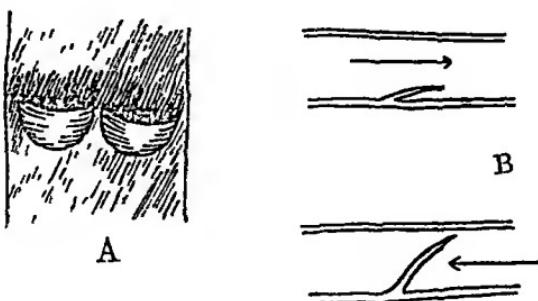


Fig 56 Section of vein.
A Pocket like valves, B Openings of tributary veins

All throughout the veins there are pocket like valves which work only one way so that no blood in the vein can return back. It has to force its way to the heart through the vena cava.

Blood Pressure

The pressure put on the elastic conduit pipes for blood or arteries is the blood pressure. During life these conduit pipes are more than full, they are always under pressure and distended. This

into the aorta. The arteries are already distended and this beat gives them a further distension ; the extra quantity of blood flows in the arteries and the capillaries in the form of a wave, and this is followed by another beat and another wave. Thus wave after wave of blood creates pulsations in the arteries and we feel the pulsation or pulse by pressing any convenient artery, specially the radial artery at the wrist. The pulse wave travels at the rate of 30 ft. per second and takes $1/10$ of a second to reach the wrist from the heart. But the travelling of the blood is quite different from the travelling of the pulsation. The blood takes about 5 seconds to reach the wrist. The pressure is feeble in the capillaries and in the veins there is not much loss of pressure once blood enters them from the capillaries, as they get wider and wider for the return passage.

The vena cava being wider than the aorta although the same quantity of blood is poured out of it, the velocity of blood is less here.

The blood supply to any organ is dependent upon the condition of the artery, the bore of which is variable by the automatic system of control. When food goes into the stomach, the stomach demands more blood than when it has less work to do. The blood vessels automatically dilate allowing more of the circulated blood to pass through the stomach and necessarily other organs receive proportionately less. There is a nervous mechanism controlling the thickness of the wall or of aperture of the arteries.

This mechanism makes regulation of the flow of blood in artery possible. .

When we are put to fright, the blood vessels of the face contract and the face looks pale While a feeling of shame makes the blood vessels dilate, more blood gets in, and the result is blushing The blood supply to the brain can also be changed by increased action of that centre of brain called the **vaso motor centre**, the centre of involuntary activities, which constricts other blood vessels than those of the brain and thereby supplies more blood to the brain

The veins and arteries usually go side by side in every part of our body, there being a few exceptions such as the hepatic veins, sinuses of the skull and veins of the spinal cord The blood goes by the arteries and returns by the veins Between the arteries and the veins there are the capillaries in enormous numbers which form net work of hair like tubes Blood travels through them necessarily at a slow rate owing to the fineness of the passage. It is when the blood is in these capillaries that it discharges the duty it is designed for The red blood corpuscles here give off their oxygen and other contents which the tissues utilise for their nourishment and some of the liquid portion of blood (serum) is exuded from the capillaries Here again in the capillaries the red blood after giving up its oxygen to tissues, takes in **carbon dioxide** and is converted into blue venous blood and returns through the capillary ends of the veins, veins being the return channels of blood From the capillaries again the

exuded serum goes to supply nutrition to the tissues. The tissues take up what nourishment they require, the excess is carried away by the lymphatic system.

Composition of Blood

The blood is a warm red liquid which carries nourishment to every part of our body. It is homogeneous and alkaline and tastes salty. It runs through the arteries, capillaries and veins and supplies nutrient materials as oxygen, carbohydrates, proteids, fats and salts to the cells and tissues. It also carries away waste materials like carbon dioxide and urea from the tissues. Blood is therefore so essential for the normal function of life.

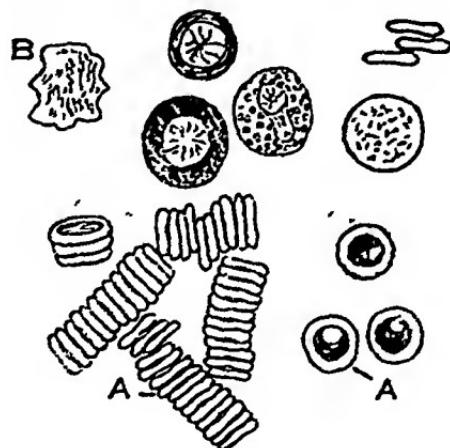


Fig. 57.

Red and white corpuscles.
A. Red corpuscle, B. White corpuscle

Blood forms 10% of the weight of the body. In an average man, there are 10 to 14 lbs. of blood. Every part of our body, every limb, every organ within the body, is steeped in blood.

Blood contains red and white corpuscles and the plasma or the fluid matter which is a mixture of water, albumin and elements of fibrin. In order to examine the prominent physical properties of blood,

a little blood may be let out by a pin prick It will be seen that it has almost immediately ceased to come out Blood clots on coming outside the body or when it gets off its own channels even inside the body. This clotting prevents further flow of blood from a wound If blood has not this property of clotting then even from the slightest scratch, the entire blood of the body could be drained out But bleeding or haemorrhage automatically stops on account of clotting, for clotting blocks the wound and does not let blood to flow any more Calcium salts upto a certain extent increase the coagulable property of blood Therefore in case of internal haemorrhages as phthisis, in bleeding from the lungs, the stomach, intestines etc , calcium salt is given by mouth or by injection

If some blood is allowed to clot and leave for some time, a fluid separates out from it This is the serum The clot consists of red and white corpuscles enmeshed in fibrin. Fibrin is formed out of the fluid material of blood or plasma If blood is stirred with a stick as it is shed, then the fibrin as soon as formed, gets entangled with the stick and may be separated out leaving red and white corpuscles and serum. Blood from which fibrin has been separated will not clot. In dropsy and hydrocele it is this serum that accumulates in the body Serum consists of water, salt and albumin

The white corpuscles of blood are very interesting substances, they can be seen under the microscope. In the blood they continually change shape Some-

times when they find difficulty in passing through the tiniest capillaries, they will squeeze to adapt themselves to the aperture. These are called phagocytes or leucocytes. These white corpuscles fight poison, foreign body, the disease germs, enclose them in their body and destroy them.

To every 500 red corpuscles, there is one white corpuscle. Their number in one cubic millimeter will be about 8,000 while there are 5 millions of red corpuscles in the same quantity of blood.

The red corpuscles are very tiny. They are made of a soft transparent frame work called the stroma and the haemoglobin which is the colouring matter of the corpuscles and forms 90% of them. These corpuscles have the property of absorbing oxygen, giving it out to tissues where oxygen is needed for work and absorbing carbon dioxide, the product of combination of its oxygen with tissue matter. This process nourishes and enlivens the tissues.

The bone marrow is ordinarily the place where the red corpuscles are manufactured. Those corpuscles which become unfit for further functioning, are taken up by the spleen. The haemoglobin is thence shed into the blood and the refuse matter is carried from the spleen to the liver to be converted into bile. The red corpuscles contain an appreciable quantity of iron.

Lymphatic System

Part of the plasma of the blood as has been said, passes through the thin walls of the capillaries. This fluid which exudes from blood vessels is called the

lymph The lymph lies in spaces between the cells of the tissues and these are drained by a network of delicate vessels called the lymphatic vessels, which unite with one another to form a few main lymphatic vessels By these main vessels the lymph is carried away from the tissue or the organ The lymphatic vessels in the body are connected with each other, the main vessel lying in the abdomen in front of the vertibræ This is the thoracic duct. These various ducts ultimately open into the vena cava so that the lymph that exudes from the blood capillaries is returned to the blood when it has discharged the function of supplying nourishment to the cells. The plasma coming out of capillaries feeds the tissues with what is necessary and the excess passes through the lymphatic glands and ducts.

Lymphatic Glands

Along the course of the lymphatic ducts, small bean—shaped bodies are found. The lymphatics enter into them by one side and leave them by the other. These are lymphatic glands. Here in some of these, the colourless corpuscles of the blood are made. The glands play very important part in working of the several systems

RESPIRATORY SYSTEM

The Respiratory Process

The capillary tubes or the blood vessels have the property of permitting outside gas or liquids to pass into or out of them. Upon this phenomenon, depends the mechanism of circulatory and respiratory systems. If some blood is taken out and not allowed to coagulate and then hung up in a bladder in an atmosphere of carbon dioxide, it will be seen that carbon dioxide gas is affecting the red blood in the bladder and making it blue. Although the bladder does not permit the liquid blood to ooze out, yet it permits surrounding gas or liquids to affect it. This is constantly taking place in the capillaries. Remaining within the walls of the capillaries, blood is feeding oxygen to the tissues and taking back the waste material into itself as also the exuded carbon dioxide gas from the nourished tissues. Now, carbon dioxide has the property of changing red colour of the blood into blue. When the arterial blood does its duty of feeding the tissues, it demands itself of its oxygen and absorbs carbon dioxide and thereby becomes blue. The blue blood is useless for further functioning and nature has therefore devised the mechanism of respiration by which venous blood can throw off its carbon dioxide and get rejuvenated by

absorption of oxygen, thereby becoming free to function again

While studying the heart, we have learnt that the blood from the veins—the returning blood—is poured into the right auricle of the heart through superior and inferior venæ cavae. The right ventricle then pumps it immediately into the lungs through the pulmonary artery.

The lungs are spongy masses in which air can get in. The air chambers are called alveoli. Here air comes in contact with the blood spread out side by side with it in capillaries. The blood gets rid of its carbon dioxide and takes oxygen from the alveoli and becoming red, returns to the left auricle of the heart as purified red blood ready to be immediately sent back through the aorta and arteries into the capillaries, to perform the same function of feeding and nourishing the tissues and draining waste matter again. The processes of respiration consist of inspiration of fresh air into the lungs which become distended and filled with air and of expiration by which the changed air containing carbon dioxide from the blood is thrown out by the act of squeezing of the lungs. These processes are usually automatic and are controlled by mechanism inside the body which makes the lungs work rhythmically and according to necessity, when in health. Man can accelerate or hold respiration voluntarily for a few minutes only.

We shall now examine the various organs and their functions that come into play in respiration. The air is sucked in through the nose. At the

entrance, the nose is divided into two chambers. Air passes through and coming in contact with nasal walls becomes warm, for the nasal walls have membranes in which blood is circulating for that purpose. The nose contains some hairs which serve the purpose of filtering the air of its suspended dust, soot and other impurities.

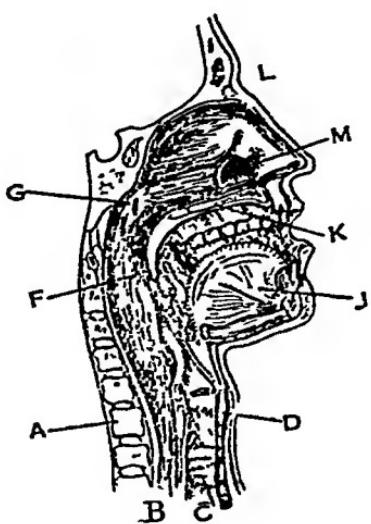


Fig. 58 The air passages.
A. Back bone, **B.** Oesophagus, **C.** Trachea, **D.** Larynx, **E.** Epiglottis, **F.** Opening of cunctachian tube, **G.** Tongue, **H.** Palate, **I.** Skull, **J.** Scroll-like or turbinal bones

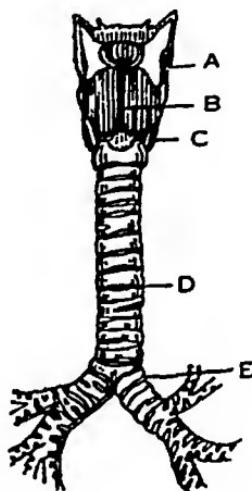


Fig. 59. Trachea and bronchi.
A. Hyoid bone, **B.** Thyroid cartilage, **C.** Cricoid Cartilage, **D.** Trachea, **E.** Bronchus

The Trachea

The air from the nose, passes on and strikes the pharynx and goes down into the larynx or the voice box and from there enters the trachea or the main air canal. The smaller particles of soot and dust that escape the hairs in the nostrils, get entangled

on the sticky surface of the pharynx. The trachea is like a piece of armoured hose containing open rings of cartilages. The trachea divides into bronchi which are two air passages taking air to the two lungs

Air may also be taken in by the mouth. On the upper wall of the cavity of the mouth is the palate which separates the nasal chamber from the mouth.

Behind the palate is the soft palate which is a thin piece of muscle. The soft palate hanging down

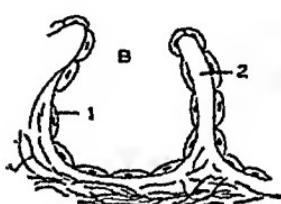


Fig. 60.

An alveolar chamber.
1. Epithelium, 2. Partition between two alveoli in which the capillaries lie,

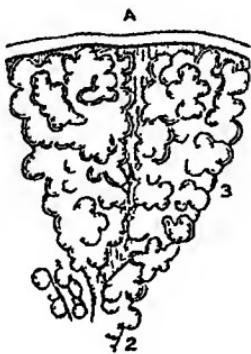


Fig. 61

1. Fine air Cells,
2 Bronchial tubes,
3. Alveoli



Fig. 62 Capillary net work of the lungs, showing alveoli.

1. Net-work of capillaries, 2 Small arteries and veins

like a screen, may separate the mouth from the pharynx. The air after striking the pharynx finds two passages before it, the oesophagus (or food canal) and the larynx. The ingoing air by suction from the lungs passes down the larynx into the trachea. The trachea is lined with hair-like processes called cilia which become straight and then bend down and in this operation move up any liquid in it, towards the mouth. During life the cilia are constantly in a wavy motion

The Bronchi

The trachea divides into bronchi which again subdivide into a large number of bronchial tubes. As these tubes become smaller their cartilage bands get less and less complete and in the smallest tubes, disappear. The finest bronchial tubes end in a cluster of dilated branches. These are called infundibula.

Cavities in the infundibula forming so many chambers are called alveoli.

Into these, the bronchial tubes supply air.

The Lungs

The lungs are made of an enormous number of these divisions connected together by connective tissues. The whole of the lungs is covered by a membrane called the pleura.

The walls of alveoli are made of fine elastic connective tissues. These are lined with a fine net-work of blood vessels. The interaction between the blood and air takes place here.

The thoracic cavity is without air and there is no atmospheric pressure in it. On the other hand, the interior of the lungs is filled with air from the

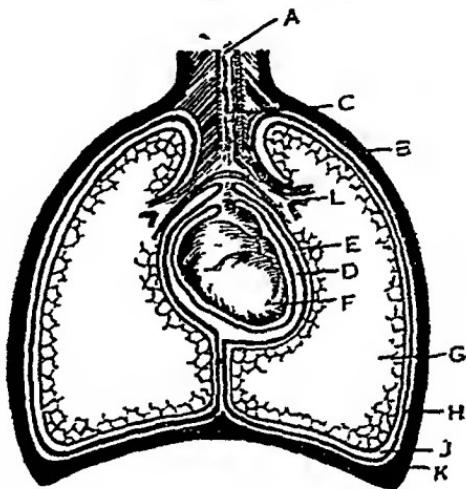


Fig. 63.

Diagram of the thoracic cavity.
 A. Trachea, B. Chest wall, C. Bronchus, D. Inner layer of pericardium attached to heart, E. Outer layer of pericardium, F. Heart, G. Lungs, H. Pleura attached to chest, I. Pleura attached to lung, J. Pleural space potential, K. Diaphragm, L. Bronchi opening into two infundibula

atmosphere. Therefore the lungs are distended normally as much as the cavity of the thorax will permit.

The mechanism for breathing consists in expanding and contracting the thoracic cavity. The thoracic cavity is bounded by the ribs. The cavity made up by the ribs is cone-shaped, its apex being at the top. The connected ribs lie obliquely. When the ribs are pushed up and thereby made less oblique, the chest becomes wider.

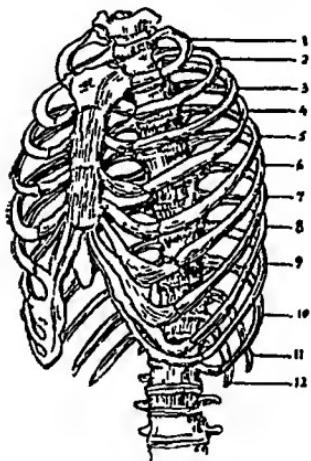


Fig 64

Cone-shaped chest wall
with ribs, cartilages
and sternum
1—12 Ribs.

Then again the muscular partition between the thorax and the abdomen called the diaphragm is not a flat one but is shaped like a dome with its top upwards.

When this partition contracts, the dome becomes flattened and the whole diaphragm descends and increases the cavity of the chest. By this joint action, we get inspiration and a provision of enlarged space for lungs which the lungs at once occupy by

drawing in fresh air. On the contrary, when the diaphragm relaxes and the ribs come back to their previous position, the capacity of the lungs is diminished and the lungs squeeze out air which is expiration.

This automatic action goes on ceaselessly during life and is controlled by nerves, the centre of which

is in the medulla and is called the centre of respiration. We draw our breath about 17 times per minute when sitting quietly but during exercise we breathe more quickly, for the tissues require more oxygen and the heart and the lungs have to work harder to meet the demand.

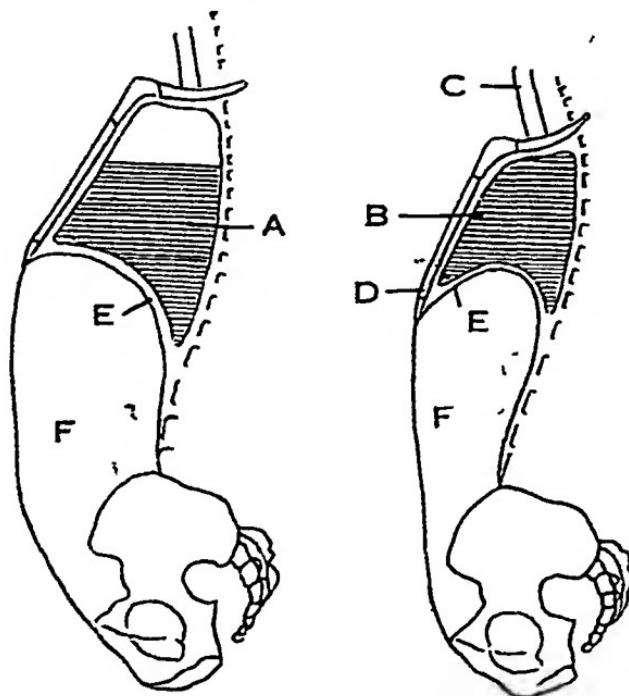


Fig. 65.

Diagram of the chest and abdominal wall, showing changes in inspiration and expiration (shaded part indicates stationary air).

A. Inspiration, B. Expiration, C. Trachea, D. Sternum
E Diaphragm, F. Abdomen

When we exhale, we throw out impure air from the lungs. The air enters the lungs and gives up its oxygen to the blood and takes up carbon dioxide, so that the exhaled air is richer in carbon dioxide than the fresh air. If we breathe in and breathe out the

same air again and again, the air will be more and more denuded of oxygen and become unfit to support life.

When a fire burns the same phenomenon, namely the extraction of oxygen from the air, takes place. The air helps combustion by supplying oxygen and becoming converted to carbon dioxide. An ordinary kerosene lamp consumes oxygen nearly two third of what is consumed by a man.

The presence of carbon dioxide may be proved by breathing into a jar containing pure lime water. If the water is shaken, it becomes milky showing that the carbon dioxide of breath has combined with lime to form calcium carbonate which is insoluble in water.

$$\frac{90}{20}$$

THE DIGESTIVE SYSTEM

The Stomach and the Intestines

The digestive system commences with the mouth and ends in the rectum. When food is masticated in the mouth, saliva which is a secretion of the salivary glands, begins to act upon and makes portions of it soluble. When food is swallowed, the bolus enters the stomach through the œsophagus. The movement in this tube is one of wave-like contraction which forces the food down. After the food has gone a distance, propelled by the constriction, another constriction follows for a next move of propulsion. The food reaches now the stomach which is a peculiar shaped piece of bag. Its exit closes down as soon as food enters. Then the process of digestion in the stomach continues. The food is churned about by the motion of the muscles of the stomach. This motion of the digestive system is called peristalsis.

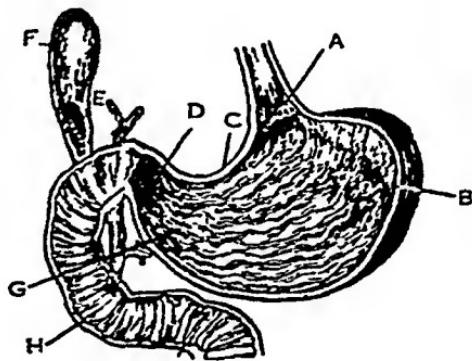


Fig. 66 The stomach

A. œsophagus, B. Stomach, C. Wall of stomach, D. Pylorus, E. Bile duct, F. Gall bladder, G. Pancreatic duct, H. Duodenum.

The bag of the stomach has several coats. The outermost is the peritoneum. It exudes a fluid and keeps the surface lubricated, so that there may be no friction with other organs in contact with it. Then there is a coat of muscle. This muscular coat gives the churning motion to the contents which helps disintegration and conversion with the aid of the fluid called gastric juice, a secretion of the stomach wall.

The next coat is the connective tissue under which there are nerves and a network of microscopic blood

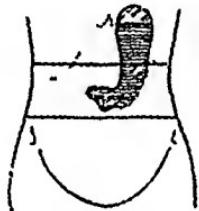


Fig. 67.
Position of the
stomach while
standing

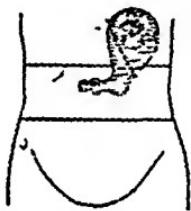


Fig. 68.
Position of the
stomach while
lying down

vessels. This coat serves to bind the muscular coat with the last mucous coat. In empty condition, the mucous coat lies in folds but as food enters, this gradually unfolds. In empty stomach, the blood vessels are empty and the coat looks pale but with the entrance of food, blood also rushes to vessels and the mucous coat becomes pink.

In close proximity to the blood vessels, there are innumerable glands called gastric glands. Presence of food excites the glands to secrete drops of fluids called gastric juice which helps the process of digestion.

Gastric juice is acid in reaction. It contains a little free hydrochloric acid which destroys bacteria and microbes taken with food and acts as a safe-guard against attacks of disease. Other constituents of the juice are pepsin, rennin, mucin, salts and water. The juice contains about 0.2 per cent. of hydrochloric acid. Pepsin and hydrochloric acid dissolve all the proteid contents of food. Protein foods are albumin in egg, casein in milk, fibrin in blood, glutin in bread, legumin in dals and beans and myosin

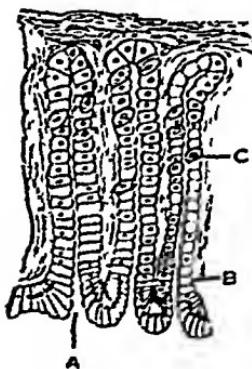


Fig. 69.

Glands of the stomach (magnified)

A. Mouth of the gland, B. Principal cells, C. Ovoid cells.

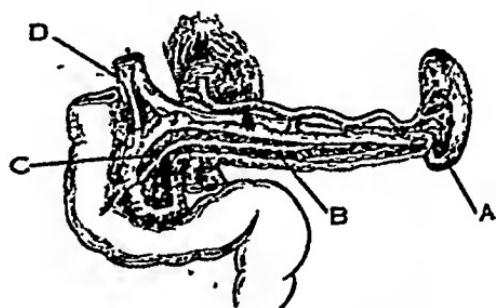


Fig. 70. The pancreas & spleen.
A. Spleen, B. Pancreas, C. Pancreatic duct, D. Bile duct.

in muscles. It does not act upon starch or fat but makes it ready for being acted upon in the next process.

The reaction of gastric juice on food in stomach leaves the mass distinctly acid and reduces it to a paste of greyish colour called chyme. The exit of the stomach or the pylorus does not open until the food is reduced to that condition. When the paste is properly formed, it is allowed to pass on.

From the stomach the chyme passes on to the duodenum. Here two small ducts unite into one and enter into it. One carries bile from the gall bladder on liver and the other conveys the secretions from the pancreas.

Food is more scientifically treated in the stomach for its absorption than any master scientist could have arranged. It is first broken up in the mouth by chewing and the starch is acted upon by saliva resulting in partial solution. Then it enters the stomach where acid and other enzymes do their work. Next it is delivered on to duodenum where alkalies must work upon the food to help the process of further assimilation.

The juices injected into the duodenum are alkaline in reaction. These alkalies neutralise the acidified mass from the stomach and then attack starch and fats etc. The presence of acid in chyme excites the flow of alkaline fluids in the duodenum. The pancreas is a mass of glands set below the stomach and the secretions from here break up starch and fat of the chyme. Milk which is curdled in the stomach, now gets broken up by the juices in the duodenum and becomes assimilable. With the fatty substances, pancreatic juice and bile form a sort of soap. After completion of the digestion here, food takes a yellow creamy colour and passes on to the lengthy tube called the small intestine.

The small intestine is a tube 20 ft in length and $\frac{3}{4}$ th of an inch in diameter.

The outer coat of the small intestine is the peritoneum which forms into mesentery at the back fixing the tubes against the support of the spine. Then there are two coats of muscular fibre. There is then the sub-mucous coat consisting of connective

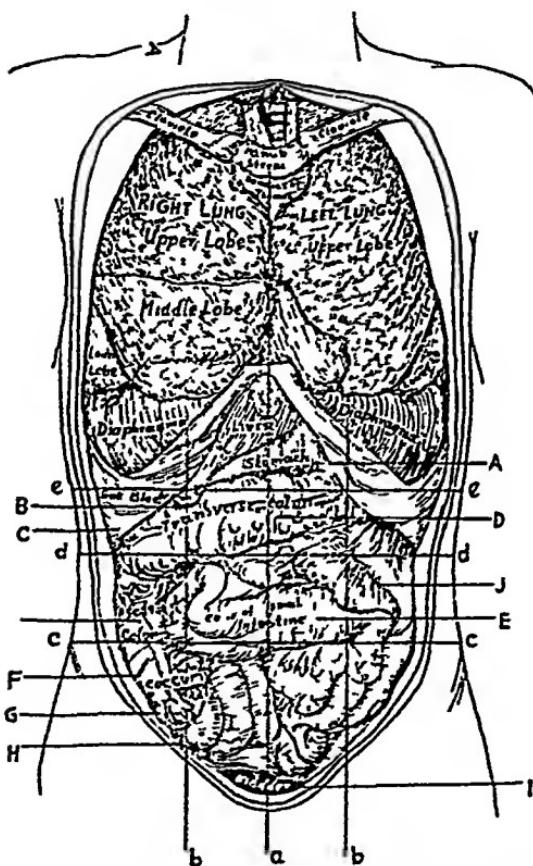


Fig. 71. The thoracic and abdominal viscera.

- A. Stomach, B. Liver, C. Gall bladder, D. Transverse colon,
- E. Small intestine, F. Ascending colon, G. Cæcum,
- H. Appendix, I. Bladder, J. Descending colon.

tissues, blood vessels and nerves. Then comes the mucous coat. This mucous membrane is thrown into innumerable folds and these folds retard the passage

of food and afford large absorption area. On the mucous membrane there are minute pimple like glands covered with epithelial cells which give the surface a cushion like appearance. They have central lymph vessels called lacteals. The fatty cream made in the pancreas, is absorbed by these lacteals. Each fold is covered with minute finger like projections called villi. The mucous coat also contains numerous glands which secrete the intestinal juice.

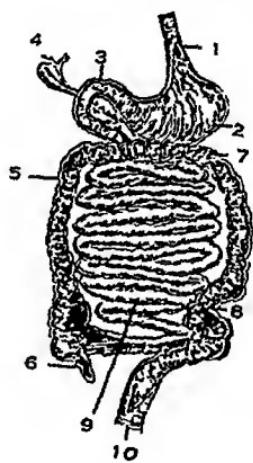


Fig 72.

The abdominal viscera.

- 1. Oesophagus, 2.
- Stomach, 3. Pylorus,
- 4. Gall bladder, 5.
- Ascending Colon,
- 6. Appendix, 7.
- Transverse Colon,
- 8. Pelvic Colon, 9.
- Small intestine, 10.
- Rectum

The juice has all the properties of the previous juices. It may be regarded as saliva, gastric juice, pancreatic juice and bile all in one. Here by the action of this juice, whatever is possible to be absorbed, is rendered absorbable and thereby digestion is completed. The absorbable portion is absorbed by the villi or the shaggy hairs mentioned before.

The residual portion is taken to the large intestine. It is divided into three portions, the ascending colon, the transverse colon and the descending colon.

There is a valve at the junction of the two intestines called ileo-cæcal valve which allows the food materials to pass in one direction only. The end portion of the small intestine is

called the ileum, it ends in cæcum where the valve lies.

Below the valve is the vermiform appendix. Inflammation of the appendix is called appendicitis. The large intestine has all the four coats of the digestive tract. From this portion little nutritious matter but practically only water is absorbed making the mass hard. Fermentative changes make the residual material acid, which now develops the odour of faeces.

Peristalsis continues in this portion of intestines also. Faecal matters are finally pushed by peristalsis into the rectum which is a chamber 8 or 10 inches long. The discharge end is called the anus controlled by the sphincter ani. This is normally in contracted state. The act of defaecation consists in withdrawal of the control of the nervous centre concerned which results in relaxation and consequent discharge of faeces.

We have found that simultaneously with the breaking up of food material into absorable form, absorption continues. The absorbed material then mixes with the blood and becomes its component. In the stomach, duodenum and the intestines, we have the same phenomenon of absorbed material flowing into blood stream. Fatty materials find themselves in lacteals from which they flow into a common passage called the thoracic duct which empties itself into the subclavian vein opening into the heart. Other digested materials such as starch converted into sugar and proteids into simpler nitrogenous bodies pass into

the blood stream in the vein which forms one large trunk called the portal vein. The contents of the portal vein are not fit for passing into the general circulation directly as components of blood. The portal vein carries blood charged with digested material to the liver where some wonderful changes occur.

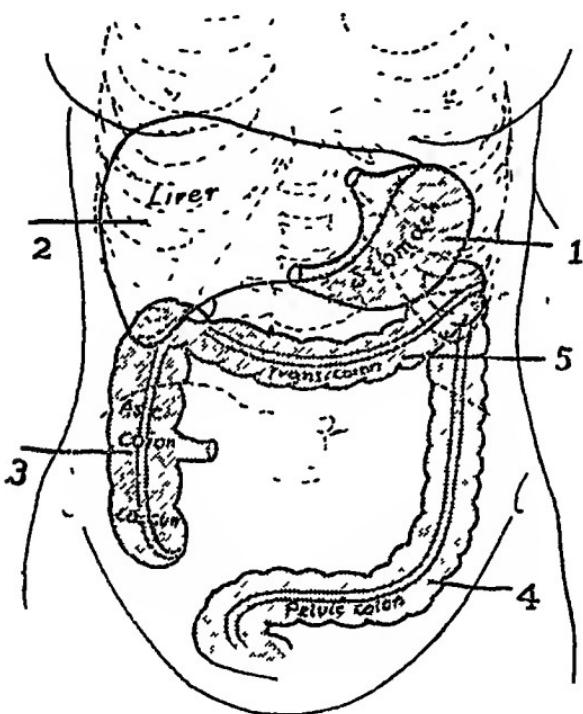


Fig 73

Diagram showing relative position of the stomach, liver and colons

1. Stomach, 2 Liver, 3 Ascending colon, 4. Pelvic colon, 5 Transverse Colon

The Liver

Liver is the largest gland in the body. It weighs from 3 to 4 lbs. The anterior surface of the liver is

under the protection of the ribs, only a little portion about an inch projects beyond the ribs (See fig 7).

The portal vein enters the liver carrying the load of digested food from its entire length. These food materials enter the lobules or groups of liver cells which are concerned with changing the food to ultimate components of blood. Starch converted to soluble sugar is carried by the portal vein. The liver allows a portion to return to blood and converts the rest to glycogen, a sort of insoluble sugar. This is kept reserved in the liver cells. Between the meals and during starvation when there is call on the blood for carbohydrates and no fresh food is admitted into the stomach to satisfy this call, blood draws upon the reserve kept in the

liver in the shape of glycogen which the liver reconverts to soluble sugar. In defective functioning of the liver, blood gets charged with more sugar than it can contain and therefore a good deal of sugar is got rid of the kidneys. Sugar then appears in urine and this diseased state is called diabetes.

The liver cells manufacture another product from the contents received out of the portal vein. It is bile. Bile is formed within the liver and is carried away

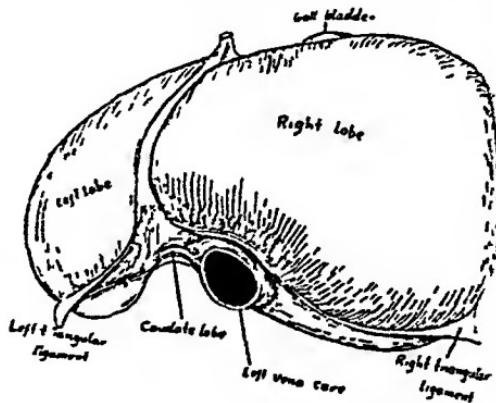


Fig 74.
Superior, anterior and lateral surfaces of the liver.

from the liver through the hepatic duct. By this duct, it is carried to the gall bladder which is a small pouch holding bile till there is a call upon it from the duodenum on the arrival of food in it. Bile helps to render fats absorbable. If bile fails to act on chyme then fats pass out unchanged with the refuse material of faeces.

When bile substance enters blood owing to derangement of the liver then the disease known as jaundice occurs. It gives yellow colour to the eyes and the skin. The liver receives from the spleen by the splenic vein, products of breaking up of the red corpuscles and from these, bile is made.

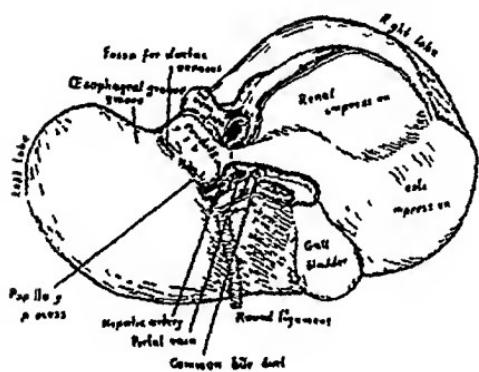


Fig. 75
Posterior and inferior surfaces
of the liver

Arterial blood enters the liver through the hepatic artery. It supplies

to the liver the power to perform its functions and then returns by the hepatic vein which also carries away the various manufactured products formed in the liver. The contents of the hepatic vein find entrance into the heart through the inferior vena cava.

The Spleen

The spleen is a dark purplish organ about 5 inches in length, placed just below the stomach on the left

side of the abdomen. It is spongy in structure and filled with a pulpy substance called the spleen pulp. From the spleen pulp, blood is collected in small veins called splenic veins and carried to the portal vein and thence to the liver. The spleen changes in size. Some 5 or 6 hours after a full meal, the spleen becomes largely distended and then shrinks. There is also in it a shrinking and relaxing motion every two or three minutes.

The spleen acts as a manufactory for the leucocytes or the white corpuscles of blood which are agents for keeping blood safe from invasion of bacteria and other attacking agents. The spleen therefore, supplies colourless corpuscles to the blood.

Some of the red corpuscles of blood, possibly those which are old and not able to function properly, are caught up in the spleen pulp, where they undergo change and gradually break down. The colouring matter of these corpuscles go to the liver and is used by the liver to make the colouring matter of bile.

During malaria, the spleen is called upon to manufacture large number of white corpuscles to kill malaria germs and at the same time dispose of red corpuscles which are destroyed by malaria germs. In malaria and kala-azar etc. spleen is called upon to do more work than it is designed to perform.

The spleen then enlarges in a diseased condition in its attempt to cope with the work, becomes hard and loses its spongy character.

EXCRETORY SYSTEM

The Kidneys

We know from analysis that human body contains nitrogen, oxygen, carbon, hydrogen, iron, calcium salts and many other substances. The blood, of course, contains all these various substances so that it supplies deficiency wherever it occurs.

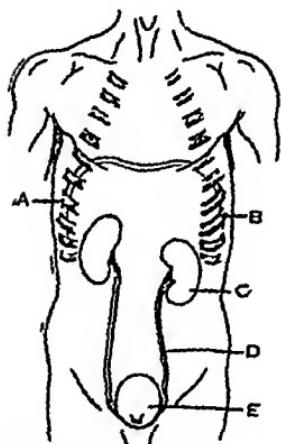


Fig. 76. The kidneys and the bladder.

A. Diaphragm, B. Ribs, C. Kidney, D. Ureter, E. Bladder.

The life process is a process of combustion. The tissues burn as a result of our activities. The waste products formed by combustion are carried away by the veins.

Apart from carbon dioxide which is discharged through the lungs from venous blood, other waste products are also formed by combustion. These also require a way out for elimination. The kidneys supply a pair of such excretory organs.

The kidneys are placed on either side of the vertebral column. They are bean-shaped. They are 4 inches long, $2\frac{1}{2}$ inches across and about an inch thick.

The inner edge of a kidney is concave while the outer is convex. The concavity at the middle of the inner edge is called the hilus. The arteries enter the kidneys from the aorta and the return blood goes to inferior vena cava. The ureters are narrow whitish tubes about 15 inches long ending into the bladder. The bladder is placed in the pelvic cavity or the lowest part of the abdomen. It is a bag which distends as it receives urine. At moderate distention, it holds about a pint of urine.

The function of the kidneys is to secrete urine which is conveyed by the ureters to the bladder. A tube called urethra leads the urine away from the bladder. The mouth of the urethra is constantly kept contracted by a muscle. By relaxation of this muscle—the sphincter muscle, the bladder ejects urine through the urethra.

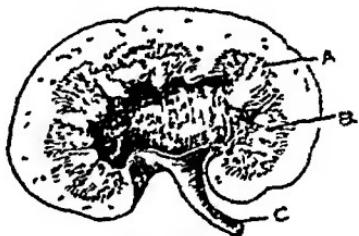


Fig. 77.

Section of the kidney.
A. Capsule, B. Pelvis
of kidney. C. Ureter.

If a section through the kidney is made then it will be seen that there is a funnel-shaped cavity in it called the pelvis of the kidney. There are projections in this cavity called the pyramids, the surface of which is filled with minute holes. They are the openings of the tubules of which the substance of the kidney is composed. The outer side of the kidney is called the cortex and the portion next to it is called medulla. The closed dilated extremities of the tubules which begin at the

cortex and end in the medulla are called malpighian capsules

Blood enters the kidneys directly from the aorta under a great pressure and passes into the tuft of capillaries or glomeruli enclosed within the capsules. Here water oozes through these capsules and passes into the tubules. As water passes down the tubules, poisonous and waste materials from the blood are added to it by the activity of the renal cells.

The stream of water passing through the tubules and enriched with salts and urea from the blood, reaches the pelvis of the kidney or the cavity of the kidney. From the lower end of this chamber, the ureter conveys the urine to the bladder. In certain nervous conditions, the control over the muscle which works for the opening of the bladder is lost. This results in wetting cloths and bed involuntarily.

Urine

Urine is a straw coloured limpid liquid with a peculiar aromatic odour and acid reaction. A healthy adult in course of a day, will pass about 50 ounces of urine. The quantity and quality however depend very materially upon the physiological processes of life, the outer temperature, moisture etc. Excess water with waste material passes out of the body as urine and sweat or by evaporation through the skin. When the skin is more active the quantity of urine gets smaller, again when there is less elimination through the skin there is more urine.

Urine contains 2 per cent. of urea which is a product containing ammonia and is formed by the breaking up of proteids. It also contains about one per cent. of sodium chloride or common salt, uric acid, sulphates, phosphates etc.. Normal urine, if kept for some time, may settle a slight sediment or deposit

From the lungs some water and carbon dioxide are thrown out from worked up blood So important is this function that if the lungs cease to operate for a short time, life becomes extinct. The whole of the blood has to pass through the purification process of the lungs before it is sent to the system through the heart.

Kidneys similarly are excretory organs and as we have seen, act as chemical filters for the blood, separating excess of water and urea and other waste products. But the whole of the blood is not purified by passage through the kidneys before it is forced through the arteries by the heart.

After the preliminary purification through the lungs, blood containing some waste-products is forced into the system by the heart. A portion of the blood from the downward current is taken to the kidneys for purification. As this purification of a fraction of the circulating blood is going on continually, the waste products cannot accumulate beyond a certain limit. Blood is taken to the kidneys under a great pressure directly from the aorta. This pressure is a factor in the operation of the filters of the kidneys. If there is a sudden high blood pressure, a large quantity of blood

will at once pass through the kidneys and cause a large quantity of urine to be secreted. If the heart is not working properly then the filters are not able to separate out as much urine and waste products as it should within a certain time, and consequently the blood gets charged with waste materials and so poisoned. When the kidneys begin to fail, water begins to accumulate in the system giving rise to the condition known as dropsy.

When a man eats a larger quantity of proteins which are in meat and dals, than is necessary, then the amount of urea excreted is increased. When a man is starving, the amount of urea in urine decreases but some urea is always found however long a man may be starving. This proves that while starving, a man consumes tissues of his own body. Urea is a waste product formed during the digestion of proteins. Proteins, in case of starvation are provided by the body itself.

The Skin

The skin is a secretory or excretory organ through the pores of which, waste products from the blood are secreted out. Some carbon dioxide is also allowed to escape through the skin.

The skin consists of two parts, epidermis or the outer layer and dermis—the inner layer. The skin is thick on the soles, palms and the back where it may be so much as one fourth of an inch thick.

The epidermis or cuticle consists of many layers of cells. The dermis or corium on which the epidermis

rests, consists of fine but strong network of connective tissues, in which a large number of yellow elastic fibres are mixed with white fibres. Connective tissue cells are also present.

The epidermis can be divided into two layers, the outer hard layer or the corneous layer and the deeper soft layer called the malpighian layer. The two layers may be separated as in a bladder. In the lower portion of the epidermis layer the pigments occur which give colour to the skin such as black or yellow.

The deeper part of the dermis is connected with the tissues under the skin such as muscle or bone by a very loose connective tissue known as the subcutaneous tissue. This consists usually of a considerable quantity of fat which helps to give a rounded appearance to our limbs. This layer is particularly thick under the skin of the abdomen. The dermis is supplied with blood vessels. These form loops of capillaries just underneath the epidermis. Blood vessels do not run into epidermis itself. The dermis is well supplied with nerves.

The skin is found, even on superficial examination, to be full of pores. These are the openings of sweat glands. The pore is the end of a spiral or corkscrew-like tube which passes through the epidermis to



Fig. 78. Section of the skin, showing sweat glands, hairs.

A Epidermis B. Dermis. C. Sweat glands, D. Fat, E. Hair, F. Hair root

the dermis. Here the tube wall thins down to a single layer of cubical cells. Deeper down, this tube coils down into a kind of knot. This coiled part is the sweat gland. Here there are numerous blood vessels. The cells of the sweat glands secrete from the blood the sweat, which is then conducted along the tube to be discharged on the surface of the skin.

In the dermis, there are situated the sebaceous glands.

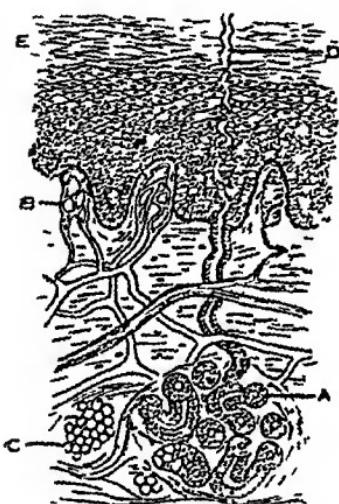


Fig. 79 Diagram to show the structure of the skin
A Sweat glands, B Papilla, C. Fat, D Duct of a sweat gland, E Epidermis

They are always connected with hairs. These glands have short ducts leading to small sacks filled with cells. The ducts open into depressions of the skin or follicle in which hair lie. The secretion is fatty.

Sweat consists of a secretion containing very little dissolved matter. Certain salts of organic acid of fatty nature constitute the dissolved matter of sweat.

When perspiration is secreted in small quantity, it is spontaneously evaporated and is called insensible perspiration, because it is not evident to the senses. In hot weather or during exercise, perspiration is poured out faster than it can evaporate and then it is called sensible perspiration. When perspiration evaporates, it takes away heat from the skin. In this

way a large quantity of heat is taken away from the body. Through the skin, we lose about a pint of water a day and excrete some waste product and lose heat as well.

Certain nervous impulses passing from the brain or the spinal cord cause the sweat glands to secrete abundantly. An emotion of shame leads to blushing by dilatation of blood vessels of the face and putting in more blood. The same emotion and fear also cause profuse perspiration of the face. By increased perspiration, mere heat is taken out of the body

THE NERVOUS SYSTEM

The Nerves

The nerves are generally white strands of fibres very glistening and soft to the touch. Each thread of a nerve appears like a tiny glass tube filled with oil. Several of these nerves are placed side by side or are intertwined to form a single composite cable-like thing.

The function of the nerve is to report to the brain and send back orders of the brain to the muscles to perform various functions. Every part of the body is supplied with nerves like the arteries and veins. If any thing is to be reported any where, the nerves must do that and if any orders are to be carried out, the nerves must carry those messages also. When I am writing, the brain is dictating to the fingers to contract and relax the muscles in such a way that the letters may be shaped and the writing may be accomplished. The speed with which the nerves carry the message, is rather slow compared with the speed of light or electricity. It is about 200 ft per second. But this speed is enough for our purposes. Besides, when a particular habit is formed, this news transmission and receiving business is simplified. Simply an order to do a thing is enough and then the nerve impulses act semi-automatically. For

-example when we learn to walk, every step has to be put with caution When we go along a particular road for the first time, we have to look about for dangers and the brain has to order and regulate But when walking becomes a habit or when we are walking along a known path many times passed over, then the legs pace the steps more or less automatically.

Nerves act automatically also. There are certain functions performed by the body over which the brain has will to direct such as writing, walking, seeing, working

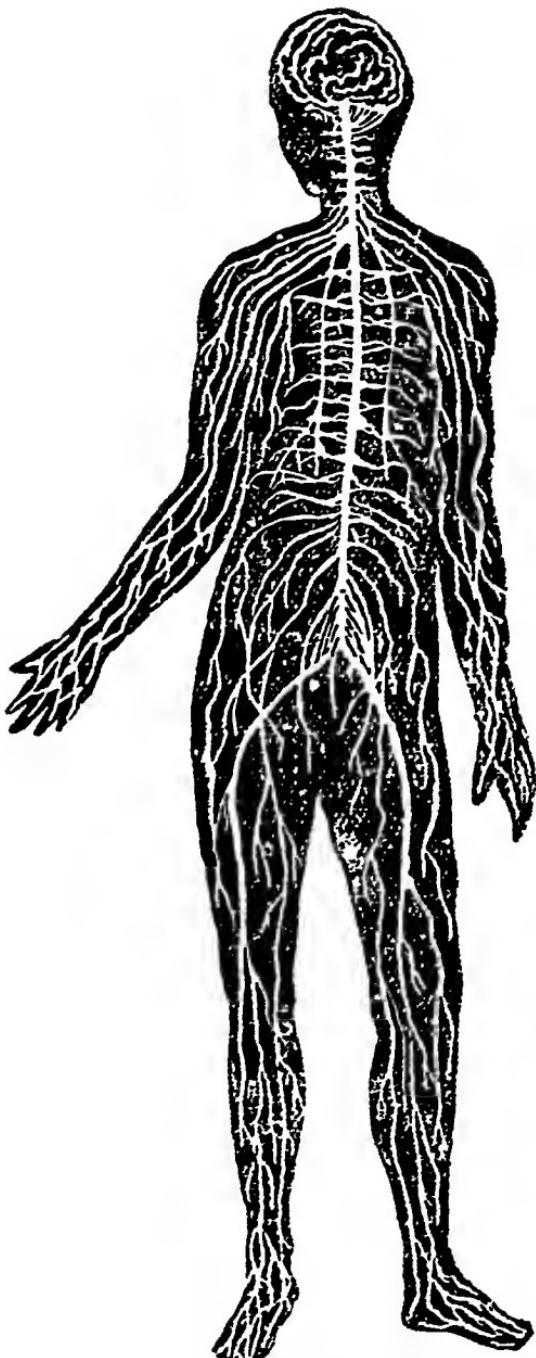


Fig 80. The central nervous system, showing the brain, spinal cord and nerves.

etc. But other functions such as of breathing, digestion, perspiration etc are performed by the body without the help of our will. The nerves carry also the messages for controlling these but not to the willing region. These functions are called **reflex actions** and messages to and from these reflex actions are carried to and from nerve centres which are not the commanding centres of the brain. When some food is swallowed and as soon as food comes

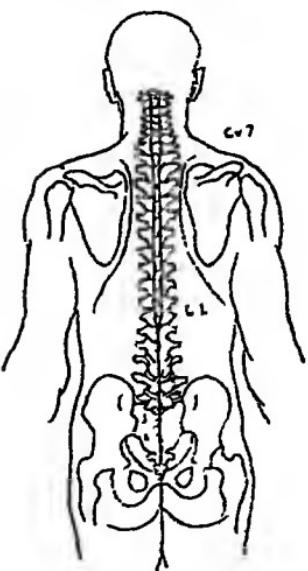


Fig. 81

Diagram showing the spinal cord ending at the second lumbar vertebra (dorsal view)

into the stomach, the exit end of the stomach is shut and peristaltic action, alternate squeezing and relaxation in the stomach begins. When there is sufficient sugar in the blood and yet more sugar is carried by the portal vein to the liver, the liver opens the factory of conversion, allows just necessary amount of sugar to go with the blood and keeps the reserve of sugar in its own cells in a readily convertible form. The liver does this without our knowing anything about it. These are not performable by automatic machinery. There is some will behind them but the will is not our will, as we know. There is somebody to start, to continue and also to order to stop. These control actions, although beyond our will, are performed certainly.

into the stomach, the exit end of the stomach is shut and peristaltic action, alternate squeezing and relaxation in the stomach begins. When there is sufficient sugar in the blood and yet more sugar is carried by the portal vein to the liver, the liver opens the factory of conversion, allows just necessary amount of sugar to go with the blood and keeps the reserve of sugar in its own cells in a readily convertible form. The liver does this without our knowing anything about it. These are not performable by automatic machinery. There is some will behind them but the will is not our will, as we know. There is somebody to start, to continue and also to order to stop. These control actions, although beyond our will, are performed certainly.

by ourselves as intelligently or perhaps more intelligently than if we had our wilful control over them. When a foreign body enters our skin or muscle and remains there, at once the machinery of the body is operated to throw this out. Inflammation occurs, blood sends leucocytes to absorb or expel this thing. The leucocytes die in the fight and pus is formed, and the wound comes to the surface if possible, and throws out the foreign body with the pus and then the healing process is continued. These are performed unerringly and in a much better way than if a surgeon were directing the blood and muscles to do this or that, for the surgeon has not even an insignificant portion of the knowledge of the maker of this body and the semi-automatic control provided by the maker within the body. Looking at this aspect, our involuntary functions are more important than our voluntary functions, for we would not be able to live a minute if the involuntary control over the functions of the body was not exercised. This involuntary controlling agency keeps the muscles of the arteries in a state of constriction allowing blood to flow at a certain pressure. If this control was withdrawn, the arteries will get relaxed offering little resistance to the blood which will then flow into those parts where it can flow without pressure and the important organs of the liver, kidneys and the brains will not have their share of blood and consequently the whole system will fail to function or respond to the requirements, resulting in death.

Now to revert to the mechanism of the nerves and nervous system, the brain and the spinal cord with the nerves proceeding from them, constitute the nervous system of the body. The brain and the spinal cord form the central nervous system. A great similarity exists between a nerve and a telegraph cable. The telegraph cable like the nerve consists of many strings and each string has a metallic core covered by protective coating. Similarly, a nerve strand has many nerve fibres and each nerve fibre has a central core called the axis cylinder. The casing surrounding is the medullary sheath, and then comes the neurolemma or primitive nerve sheath. The cylinder of a nerve constitutes the essential part of a nerve fibre. It is one of the long processes of the nerve situated in the brain or spinal cord. The impulse or nervous force which is generated in the nerve cell from which this particular axis cylinder arises, is carried along this central part to its point of destination. Covering the medullary sheath or medulla is the outer sheath, a thin delicate membrane called the neurolemma. The neurolemma is continuous throughout the length of the fibre. The medullary sheath is broken here and there along its length at intervals of about one twenty-fifth of an inch. These breakings are called nodes.

In some nerve fibres there is no medullary sheath, the neurolemma alone covering the axis cylinder. These are called non-medullated nerve fibres. They are grey in appearance, while the medullated nerves are white.

Those nerves which carry impulses to the central nervous system are called afferent nerves and those which carry impulses from it are called efferent nerves. Afferent nerves are also called sensory nerves for they carry the sensations from the various organs and the efferent nerves are called motor nerves as they carry the messages to the muscles for making movement. Sometimes the nerves enter ganglion cells. Those ganglion cells are situated on the nerves near their origin in the central nervous system or near their endings in various organs.

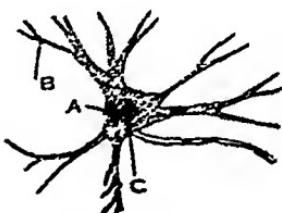


Fig. 82. Nerve cell.

A. Nucleus, B Branched process, C. Unbranched process.

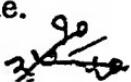


Fig. 83

Nerve structure
D. Medulla. E Node.

The nerve cell contains a large round nucleus. The cell gives off processes and one of these is a strand which becomes continuous with the axis cylinder of a nerve fibre. The axis cylinder of a nerve fibre may be looked upon as a long process of a nerve cell.

The brain and the spinal cord are made up of medullated nerve fibres, non-medullated nerve fibres and nerve cells or ganglia, together with some fine supporting tissue.



The Spinal Cord

The brain is protected by the skull, the brain matter filling its cavity. The spinal cord is protected by the vertebræ which form the walls of the vertebral canal through which the spinal cord passes. The cavity of these bones is lined first with a lining called dura mater which is rough on the bone side and smooth in the interior. Then the brain and the spinal cord are encased in a delicate membrane called the pia mater which is rich in blood vessels. Between pia mater and dura mater there is space containing a fluid called the cerebrospinal fluid and some loose connective tissue which is called the arachnoid membrane.

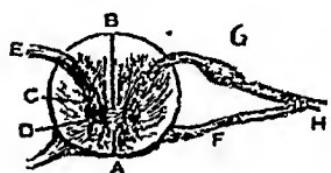


Fig 84 Cross section of the spinal cord

A Anterior fissure, B Posterior fissure, C White matter, D Grey matter, E Posterior root, F. Anterior root, G. Ganglion on posterior root, H Trunk of a spinal nerve

The spinal cord extends from the brain case downwards to the second lumbar vertebra and is about 18 inches long and half an inch thick. The spinal cord is a round structure divided into two portions by two grooves called the anterior and the posterior fissures.

The two fissures extend so deep as nearly to meet, leaving a narrow connection link within which is a small canal called the central canal. Connective tissue with pia mater passes into the fissures carrying blood vessels.

The cord has a white substance outside and a grey substance inside in each half. The grey matter is

in the shape of a crescent having two horns, the anterior and posterior horns. White matter lies all round the crescent of grey matter and the two halves are connected by grey matter.

The spinal nerves are given out from the spinal cord at intervals along its length. There are 31 pairs of spinal nerves. Each single strand of this pair contains nerves from the anterior and posterior roots which unite to form a nerve trunk. Before joining to form a trunk the posterior root has a knot-like enlargement or the ganglion.

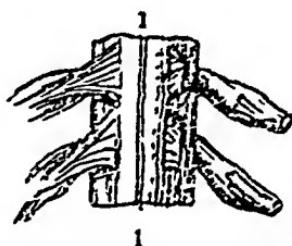


Fig. 85.

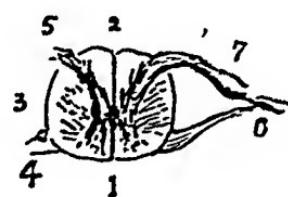


Fig. 86.

Fig. 85. Front view of the spinal cord, showing anterior and posterior roots.

Fig. 86. Section of the spinal cord.

1. Anterior Fissure, 2 Posterior Fissure, 3. Grey matter, 4. White matter, 5. Posterior root, 6 Trunk of a spinal nerve, 7. Ganglion.

In the spinal cord the anterior root springs largely from the grey matter of the anterior horn. The posterior root largely comes out of the white matter while a few go into the grey matter a little higher up, but reaching the bulb of the medulla, most of them pass into the grey matter where they end in contact with nerve cells.

As the nerve trunk is traced back to the spinal cord, it is found that at the junction of the two roots; the motor and sensory nerves are sorted out. All the sensory nerves pass into the cord by the posterior root which is therefore called the sensory root and all the motor fibres enter the spinal cord by the anterior root which is called the motor root of the spinal nerve.

When the posterior root of a spinal nerve is injured, the part to which the nerve goes becomes senseless, that is, if that part is pricked, no sensation is produced but if the anterior root is uninjured the part can be moved. If on the other hand, the anterior root is injured and the posterior is uninjured, then the part can not be moved while sensation of heat, cold, pain or pleasure can be felt.

Seats of Reflex Action

If a man's spinal cord is injured somewhere above the sacral region, then impulses cannot pass to and from the brain to the lower parts. Now if his feet is pricked his legs will be suddenly drawn up although he cannot feel the prick or cannot of his own will draw up his legs. His sensory and motor nerves being cut off from the brain, he can neither move nor feel any sensation of the lower limb. But this sudden drawing action is explained as a **Reflex Action**. The tickling causes the sensory impulses to pass along the sensory fibres of the nerve along the posterior root into the spinal cord. These impulses act on the grey matter of the cord in such a way that they cause new motor

impulses to arise. These impulses pass from the grey matter of the anterior horn to the nerves of the muscles of the leg and then the muscles contract

A movement produced by the spinal cord or the brain without the action of will, in consequence of sensory impulses brought in, is said to be produced by reflex action. The spinal cord in this way forms sub-stations for governing the body apart from the brain itself. This is brought about by what are called nerve centres placed along the spinal cord. These can act without the command of those other cells of the cerebrum which are actuated by our volition or will. Some of the important involuntary or reflex acts are: contraction and dilatation of the eyes according to the strength of light, respiration, secretion of saliva and perspiration, circulation of blood, digestion etc.

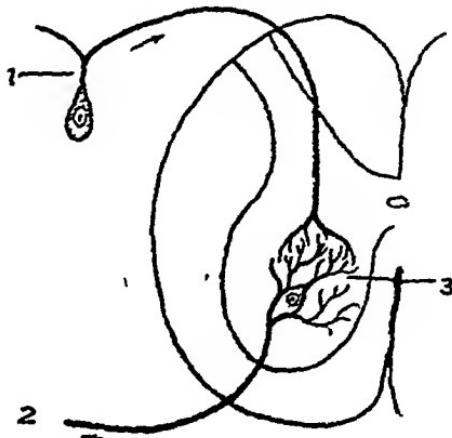


Fig. 87. Section of the spinal cord, showing the reflex arc
 1. Sensory nerve fibre afferent,
 2 Motor nerve fibre efferent,
 3 Nerve cell



Fig. 88. A section through spine.
 1. Spine of vertebra 2
 Meninges, 3. Spinal fluid, 4.
 Spinal cord, 5. Sensory and
 motor nerve trunk.

The nerves carrying out the reflex action are called the sympathetic nerves. They generally have no medullary coating

2 v b
no

The Brain

The portion of the central nervous system which is enclosed within the cavity of the skull is known as the brain. The place of a creature in the creation can be judged from its brain. The lower animals have insignificant brains. In the mammals the brain is better developed. The brain of apes resembles very much the brain of the man. But the human brain is the most highly developed brain and most complex. The weight of the brain of a man is ordinarily 3 lbs but it may go upto $3\frac{1}{2}$ lbs or more in people who do a good deal of intellectual exercise, while in an idiot it may dwindle down to say, 18 or 20 ounces. The proportion of weight of the brain to that of the whole body in man is much higher than that of any animal.

When the man is in a state of foetus of a month, the whole of the brain consists of a slender delicate tube placed at the head of the backbone. The tube gradually swells up and divides into three ball-like structures. They represent what afterwards develop into three portions of the brain, the fore-brain or cerebrum, the middle brain or mesencephalon and the hind-brain or cerebellum and medulla oblongata. The cerebrum is the biggest portion of the brain. It occupies the whole of the vault of the skull being divided into two hemispheres, the right and the left.

The white nerve fibres pass from one hemisphere to the other and also go to the other sections of the brain. These fibres gather into a cable and then divided into two, one going to the hind-brain and the other to the medulla. In each half there is space which is more or less filled with a serum-like substance called cerebrospinal fluid. This serves as a water-cushion and takes up shocks that may injure the brain. Each hemisphere of the cerebrum is connected with

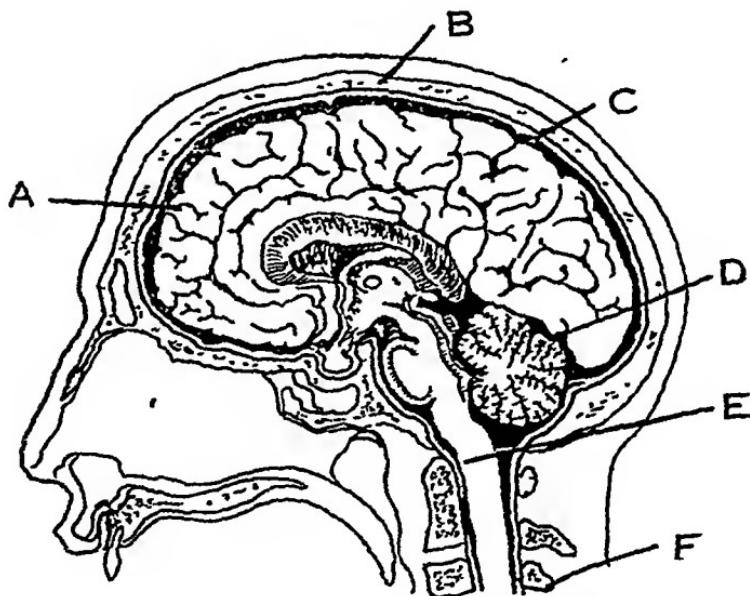


Fig. 89. Sagittal section of the brain.

A. Cerebrum, B. Skull, C. Cerebellum, D. Cerebro-spinal fluid, E. Medulla oblongata. F. Spinal vertebrae.

the opposite side of our body for voluntary working. In a right-handed man the left side of the brain is more developed, whereas in a left-handed man the right side is more developed. The surface of the brain is thrown into a series of convolutions which

are of the same pattern in all men. But in detail, one brain differs from another. The hemisphere is divided into frontal, parietal or upper, temporal or side and occipital or back region. The frontal region is said to be the seat of intelligence, the parietal of moral sentiments, temporal of animal propensities and the occipital of domestic instincts of the man.

In the spinal cord grey matter is in the interior surrounded by a periphery of white matter, whereas in the brain there is a thick layer of grey matter on the surface enclosing within it a core of white matter. The grey matter consists of nerve fibres carrying messages to and from the brain cells. The brain cells are divided into groups forming the different brain centres. The more important nerve cells form the grey matter of the outer layer of cerebrum where they exist in millions.

The frontal lobe is regarded as devoted to the higher operations of the mind. It is the seat of will. This may be called the intellectual arc. The back part of the frontal lobe is the motor area of the brain. Every voluntary movement is the manifestation of energy from this portion of the brain.

Behind the motor area is the sensorium or sense area. The motor and sensory areas are so related to each other by association fibres that impulses reaching one area of the brain can modify the activity of the other area. The centres of speech, hearing, vision etc are allocated to the different areas in the brain.

The Cranial Nerves

There are 12 cranial or cerebral nerves that leave the brain

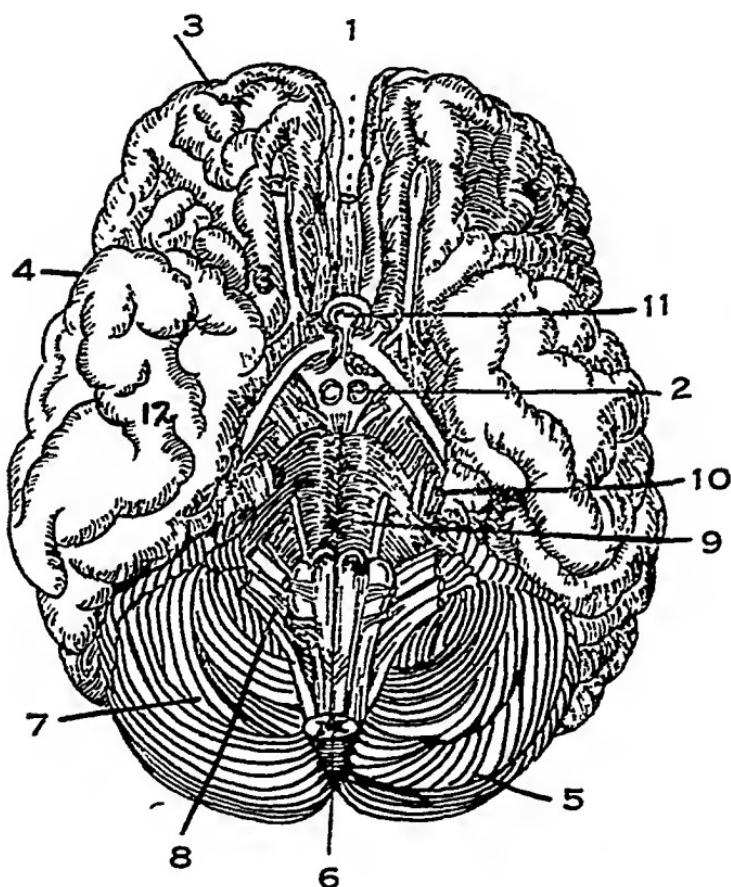


Fig. 90. The Base of the brain.

1. Corpus callosum, 2. Corpora mamillaria, 3, 13. Frontal lobe, 4, 12. Temporal lobe, 5, 7. Cerebellum, 6. Medulla oblongata, 8, 9, 10, 11, 14. Cranial nerves.

1. Olfactory nerves or nerves of smell.
2. Optic nerve or nerve of sight.
- 3,4,6. Motor nerves for eye balls.

- 5 Nerve for sensation of the face, movements of the jaw and of the tongue called trigeminal nerve
- 7 Facial nerve or motor nerve for the face and mouth
- 8 Auditory nerve or nerve for hearing
- 9 Glosso-pharyngeal nerve, the sensory part to the tongue, being the nerve of taste
- 10 Vagus nerve , partly motor, partly sensory, passes down the neck to the thorax and abdomen, giving branches to the larynx, the lungs, the heart, œsophagus, the stomach, intestines and the liver.
- 11 The spinal accessory nerve going to certain muscles of the neck
- 12 Hypoglossal nerve It is a motor nerve for the muscles of the tongue

The medulla oblongata or spinal bulb gives rise to 6 of the 12 cranial nerves It is in many other ways a very important part of the brain The respiratory movements are originated and regulated in the respiratory centre placed in the medulla or spinal bulb The beat of the heart is also regulated from here The impulses that regulate the bore of the arteries also originate here in the part called the vaso motor centre Swallowing, vomiting, secretion of saliva and other processes are governed from here Besides performing these functions, the medullary bulb forms the route through which all the impulse-carrying nerves pass on their way to the spinal cord

It is the crossing through which the nerves from the right limbs pass on to the left hemisphere and from the left limbs to the right hemisphere.

That the cerebral hemispheres are the seats of will is demonstrated by depriving a frog of its hemispheres leaving other parts of the brain in tact

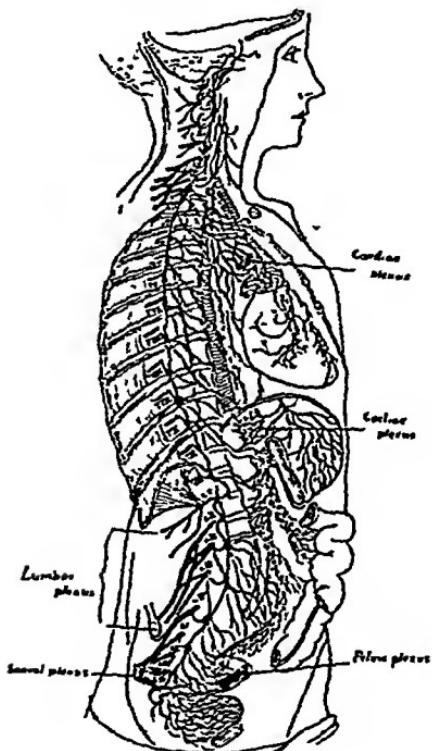


Fig. 91. The sympathetic system, showing cardiac, cœlic, lumbar, sacral and pelvic plexuses.

The frog then sits up in the attitude of an ordinary frog, and if placed in abnormal position takes the correct position and if placed in water continues to swim till it gets to land on regaining which it again remains sitting and will remain at rest till disturbed again. The hemispheres are necessary for originating voluntary movements but the other parts of the brain can give rise to complicated and well balanced movements provided that afferent impulses are received.

The Sympathetic Nerves

The sympathetic system of nerves has been called the involuntary nervous system because we cannot control this system at our will. It has also

been called automatic nervous system as it is not dependent on the brain for its functioning. It consists of two strands of tissue lying on each side of the vertebral column. These strands are composed of chains and knots. The knots are ganglia connected to the brain and the spinal cord by the white and grey roots.

One of the chief functions of the sympathetic system besides those mentioned, is the regulation of the heart and the blood vessels. For regulating these, plexuses or networks are formed in front of the vertebral column between the two sympathetic chains.

Some of the plexuses are —

- (1) Cardiac plexus
- (2) Solar or epigastric plexus
- (3) Pelvic or hypo-gastric plexus

The cardiac plexus is a network of nerve fibres formed by the sympathetic and the vagus (or tenth cranial) nerves. From this, the heart muscles receive their nerve supply. The vagus carries the inhibitory impulses to the heart and the sympathetic carries the opposite or accelerating impulses. The heart is, therefore fully under the two-fold control of the vagus or restraining nerve and sympathetic or accelerating nerve. When the vagus nerve is cut off and its restraining influence is withdrawn, the heart then beats at a very quick rate, if however the vagus centre is stimulated there is more control of the speed of the heart which then slows down. When the sympathetic nerves are cut off, then the heart beats

slower and slower and when they are excited, the heart begins to beat faster than normal.

A special system of control of arteries and a part of the sympathetic system is the vaso-motor system. This system consists of a vaso-motor nerve centre and vaso-motor nerves.

This vaso-motor centre is situated in the medulla and is sending down rhythmic impulses to the various vaso-motor nerves. These impulses keep the arterial muscular coating in a state of contraction. Without this control, the arteries would dilate and afford larger room for the flow of blood and thereby reduce the blood pressure. The result of this is that at a given time less blood will pass to the organs, which will mean poor circulation. The effect of such poor circulation would be first felt in the brain which being deprived of its proper quantity of blood supply, cannot carry on its functions rightly and the man becomes unconscious.

The controlling influences of the vaso-motor centre are called forth every moment for our work in the system. During digestion shortly after meals, it is necessary to supply large quantity of blood to digestive organs. For this purpose the small arteries in the abdomen are relaxed, a larger quantity flows into this area which means correspondingly less blood in other areas, such as the skin. The skin then loses warmth. This accounts for the sensation of chill after meals. The vaso-motor nerves again controlling the arteries to the skin, dilate them causing more blood to flow when there is a necessity for

reducing the temperature of the body, on the contrary when the body heat is to be conserved against radiation, the vaso-motor nerves constrict the blood vessels and less blood passes to the skin, and there is less cooling down In this way the vaso-motor system keeps the body temperature constant

The arteries carrying blood to the brain, the heart and lungs are without any control and their calibre is not regulated. The vaso motor nerves do not serve these organs. The absence of vaso motor control of the arteries makes the brain susceptible to various influences. The whole circulating system is controlled so that on occasions there is more or less blood sent out to this or that organ and the brain being uncontrolled whenever more blood goes to some other part, there is less blood in brain and again whenever there is a constriction of blood vessels in other parts more blood flows to the brain In constipation there is obstruction to circulation and therefore elevation of blood pressure This sends more blood to the brain resulting in headache This is the reason why persons suffering from constipation suffer also from headache. There may be other reasons for headache also. For example absorption of poisonous material by the blood creates general uneasiness and headache

The solar or cœliac plexus is situated in front of the abdominal aorta behind the stomach. It controls the abdominal and intestinal muscles Network of nerves from the solar plexus and the vagus nerves control the movements of the muscular system

of the whole alimentary canal from the stomach down to the colon. Simultaneously with the arrival of food, rhythmic contraction and relaxation or the peristaltic action begins which carries the food through the various portions of the gut completing digestion and assimilation. This is controlled from the solar plexus

The pelvic plexus is situated behind the bladder. It supplies the organs situated in the pelvis such as the bladder, rectum, anus, and uterus and ovary in females

EYE, EAR AND LARYNX

The Eye

The eyeball is an organ sensitive to light and is suspended in its bony cavity in the skull. The cavity protects the ball on all sides except at the front where it is guarded by the eyelids. The eyeball is attached behind by the optic nerve and six striated muscles connect the eyeball with the wall of the cavity or

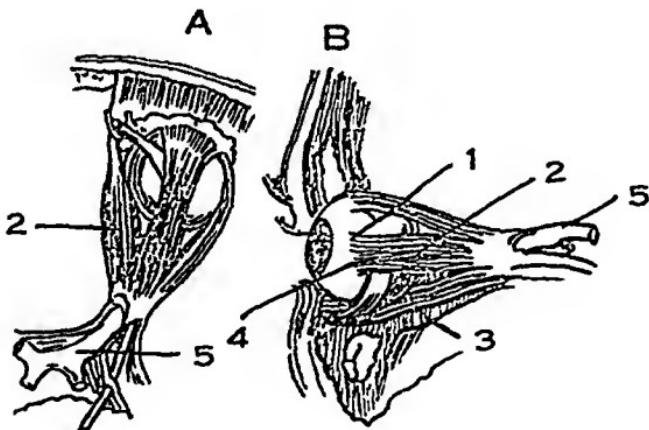


Fig. 92 A-B. The muscles of the eyeball.

1. Eyeball, 2 Superior oblique, 3 Rectus inferior,
- 4 Rectus lateralis, 5 Optic nerve

orbit. Four of these muscles are straight or recti-muscles and are called superior, inferior, external and internal recti-muscles. There are two slanting muscles, the superior and inferior oblique muscles. With the help of these 6 muscles, the eye can be

directed or rotated to any direction. The movement of the eyeball must be a very complicated one but the six muscles can direct it at any angle in any direction.

The eye has three coatings. The outer coating is that of the cornea which is in front of the eye. Behind the eye, lining the cavity, this coating is continued and is called the sclerotic coat. The middle coating has got three names behind, it is called (a) the

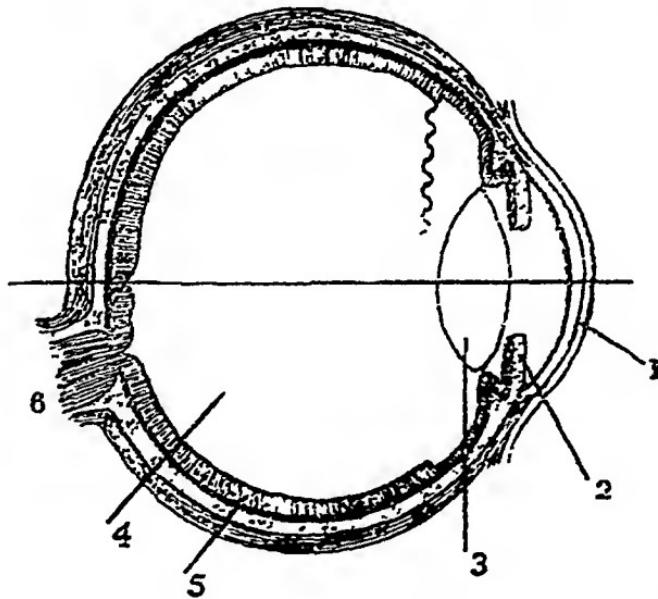


Fig. 93. The eyeball.

1. Cornea, 2. Iris, 3. Lens, 4. Vitreous humour.
5. Retina, 6 Optic nerve.

choroid coat and is super-imposed over the sclerotic coat. At the edge of the cornea this coat separates from it and projects out to form (b) the ciliary body or the hairy coat and just behind the cornea it is projected as a circular screen called (c) the iris in front of the lens

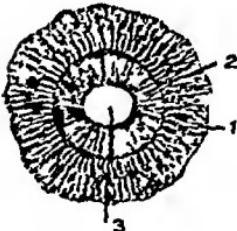
The middle coat is a vascular pigmented coat having a black lining. Within the iris is an aperture called the pupil. The last or inner coating, is called the retina.

The top coating of the cornea and the sclera is of firm dense fibrous tissue and elastic fibre which form the white hard covering for the eye. To this coat are attached the various muscles which move the ball. In front, this coating loses its white colour and becomes transparent so that the black pigmented middle coating can be seen through it. This transparent portion is called the cornea. Before the

choroid or middle coat becomes continuous with the iris it is thrown into a number of folds arranged in a radiating manner all round. These folds are the ciliary processes. These folds are also covered with a layer of black pigment cells.

Fig. 94 Iris.

- 1 Ciliary processes, 2 Iris, 3 Pupil.



The diagram shows a circular cross-section of the iris. At the center is the pupil, labeled 3. Radiating from the pupil are numerous fine lines representing the ciliary processes, labeled 1. The entire circular area is labeled 2 and represents the iris.

The iris is like the diaphragm of a camera, and the pupil is like the aperture of the diaphragm. The size of the pupil is variable and can be regulated by the muscles of the iris or the diaphragm. In shade the pupil enlarges taking in more light in the eye through the enlarged aperture; in direct light of the sun, the pupil contracts to a pin-hole so as to shut out all unnecessary light.

As we look at the eye from outside we find that the lids protect it. The lids are composed of dense

fibrous connective tissue with a lining of thin delicate membrane called the conjunctiva. The lids terminate in hairs called eyelashes. There are glands at the roots of these hairs. Inflammation of these glands is known as stye.

The eyeball is embedded in the socket having a padding of fat behind. In disease this store of fat may be gone, then the eyes look sunken.

The eye requires constant washing or moistening. For this purpose, nature has provided tear glands or lacrimal glands at the outside top corners of the eyes. The water from this gland moistens the eye and the excess passes down to the lacrimal duct starting from the corner of the eye nearest to the nose. The duct carries the excess water to the nose, the lacrimal duct being the main pipe of the gland emptying into the nose. When excessive tears appear on account of emotion or shock the drops of tear overflow the eye and run down the cheek.

The cornea is a projecting transparent and almost circular portion of the eye. The space between the cornea and the iris is filled with a thin watery fluid called aqueous humour.

Behind the iris, comes the crystalline lens. It is a transparent glass-like lens composed of jelly-like substance placed in layers like those of onions. The lens is suspended from the ciliary body by ligaments. Behind the lens the large cavity of the eyeball is filled with a matter called vitreous humour. At the back behind the lens is the retina which is the sensitive portion of the eye. The retina is almost

entirely composed of the nerve terminations of the optic nerve.

In the act of seeing, the rays of light falling on the eye pass through the transparent portion of the cornea and penetrating the aqueous humour enter the lens through the aperture of the pupil. The pupil cuts off side rays in order to give a clear image. The aperture is also regulated by the amount of light needed. Light from the object then enters the lens and passing out of it strikes the retina. The lens is bi-convex and the image formed on the retina is a reversed image of the object. But this reversed

image is no bar to our seeing the object upright as the actual seeing is done by the brain which corrects the inverted visual impression to an upright one.

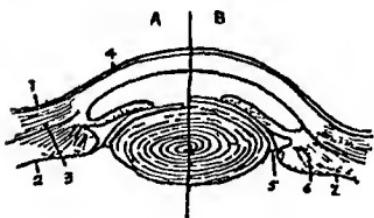


Fig. 95

The changes in the lens in accommodation.

A Adjusted for distant objects, B Adjusted for near objects

1 Conjunctiva, 2 Choroid,
3 Sclera, 4 Cornea,
5. Suspensory ligament, 6.
Ciliary muscle, 7. Ciliary
process

The lens like all ordinary lenses forms the image of the object at its focus. The place where the image is formed behind the lens depends upon the distance of the object and also upon the curvature of the lens. In the case of the eye we have got the place of image fixed at a definite place. The image must fall on the retina. In order to accomplish this, the curvature of the lens is varied by means of the ligament attached to the lens.

For distant object the lens becomes flat; for nearer object the lens becomes more convex.

This power of the lens to adapt its curvature according to the distance of the object is called accommodation. The lens is elastic. If its surface is made flatter by pressure, it recovers its original curvature and shapes when the pressure is relieved. The lens is enclosed in a transparent capsule of membrane which is attached to suspensory ligaments attached to the ciliary processes. This ligament is naturally tight and keeps the lens normally under pressure and therefore less convex than if the pressure were removed. By contraction of ciliary muscles, the ligaments are slackened and the lens by its own elasticity becomes more convex. This happens when we are looking at a near object.

It is difficult to see objects nearer than 5 or 6 inches from the eye, for the lens cannot be made convex enough to bring the image on the retina. Short-sighted persons cannot see distant objects clearly, because the flatness of the lens is not enough or in other words, the image strives to form past the retina. In order to bring the image on the retina the lens of the eye has to be flattened more. This is accomplished by putting concave spectacles before the eye. Similarly old men who are long-sighted can not see near objects clearly. The defect is remedied by adding to the curvature of the lens of the eye by wearing convex spectacles.

Visual Sensations :—The impression made by light lasts for a certain time after the light is taken off.

This is about one eighth of a second So that if two flashes occur at less interval than this, the eye sees a continuous flash This explains why a piece of red hot charcoal moved quickly at night gives the impression of an unbroken streak of red Upon this is based the projection of cinema pictures Separate pictures are flashed before the eyes very quickly The eyes join the separate units and get a moving picture.

The Ear

The ear is divided into three parts by physiologists The outer, the middle and the inner ear The outer

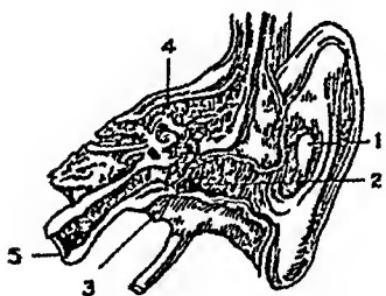


Fig. 96. Ear.

1. External ear, 2 External auditory canal, 3. Tympanic membrane, 4. Semi-circular canals, 5. Eustachian tube.

ear consists of what we see namely, the fan-like projection called the pinna and a canal leading inwards. The external portion serves to collect the sound The canal leading from the pinna is the external auditory canal. The entrance to this opening is guarded by some hairs and the glands

inside secrete a sort of wax which protects the interior organs from dust and water. The wax is bitter and therefore repels ants and insects that may try to approach the extremity. This auditory canal ends in a diaphragm called the drum or tympanum The middle ear begins from here

The middle ear is a cavity in the bone of the temples. This cavity has the tympanum at outer end From the other end, a tube communicates with the throat chamber. This is called the eustachian tube. This opening in the throat is kept closed except at the time of swallowing when it opens. The object of this tube is to keep the atmospheric pressure in the middle ear same as that of outside. If this tube

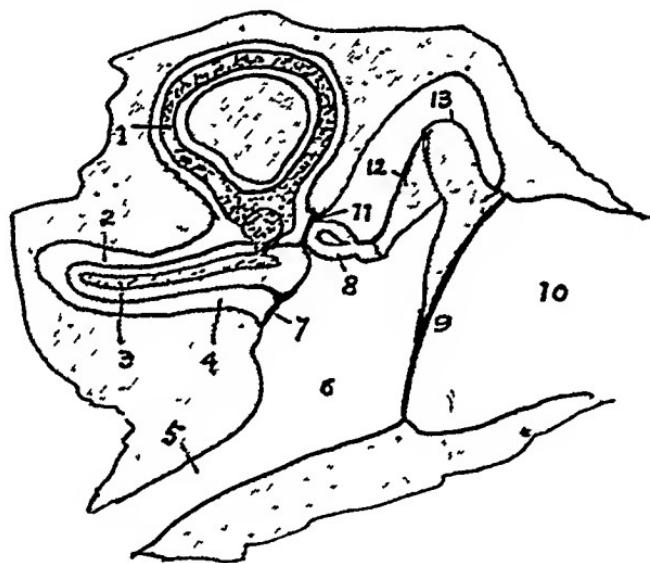


Fig. 97. The middle and internal ear.

1. Membranous labyrinth,
- 2, 4. Cochlea,
3. Canal of the cochlea,
5. Eustachian tube,
6. Middle ear,
7. Fenestra rotunda,
8. Stirrup,
9. Drum,
10. Ext. auditory canal.
11. Fenestra ovalis,
12. Anvil,
13. Hammer.

is clogged by secretions during an attack of cold, then temporary deafness results. Sound from the outside strikes the ear drum or tympanum and vibrates it. This vibration is communicated to the inner ear through the medium of the middle ear. Besides

the opening of the eustachian tube, the cavity of the middle ear has two other openings both closed by diaphragms. To the inner side of the tympanum is attached a series of three bones, the last one of

which touches the membrane covering the opening to the inner ear called *fenestra ovalis* or the oval opening. The other opening to the inner ear is called *fenestra rotunda* or round opening. It is simply closed by a membrane. The importance of the middle ear lies in its communicating the vibrations of the outer air from the tympanum to the inner ear membranes which keep the oval and round openings of the inner ear closed. Three bones, hammer, anvil and stirrup serve to communicate the vibrations of the tympanum to the membrane of the oval opening. These bones are delicate and are called the

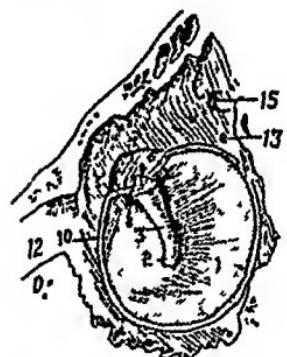


Fig. 98.

The attachment of the hammer to the tympanic membrane (internal view).

1. Tympanic membrane,
- 2 Handle of hammer,
- 12 Auditory tube

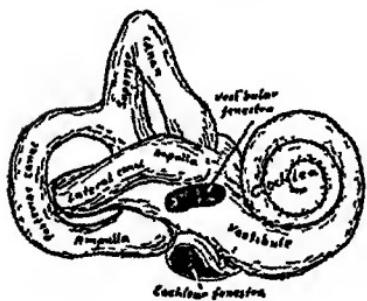


Fig. 99.

The semi-circular canals.

auditory ossicles The part like the handle of the hammer is attached vertically to the inner side of the tympanic membrane. The rounded head of the hammer articulates with the cup-shaped end of the

second bone called the anvil. The other end of the anvil articulates with the stirrup-shaped piece called stirrup. The foot plate of the stirrup is attached to the membrane covering the oval opening.

These bones are kept in place by muscles and ligaments. The inner ear which is the essential part of the organ of hearing and in which the auditory nerves end, consists of a membrane in the form of a closed bag with different parts of peculiar forms. This bag lies in a cavity of similar shape in the bone of the temple. The cavity of the inner ear is a completely closed one, the two oval and round openings from it to the middle ear being closed by membranes.

Between the membranous bag and the walls of the cavity there is a very thin space left. This space is filled with a few drops of lymph-like fluid

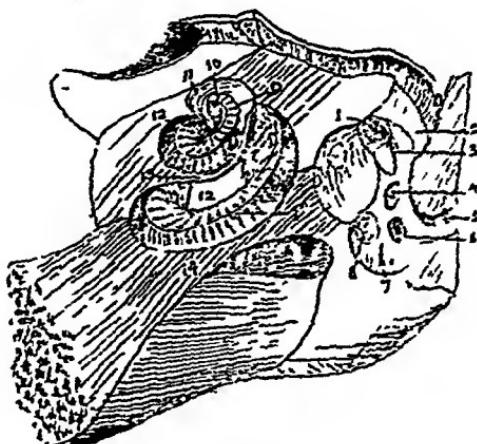


Fig. 100.
The cochlea and the vestibule.
1-8. Vestibule, 9-14. Cochlea

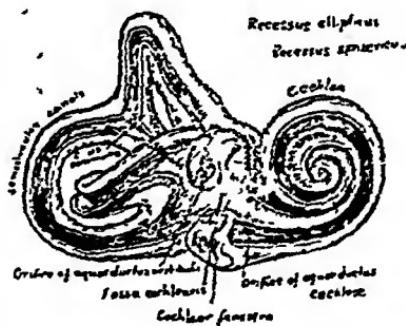


Fig. 101.
Interior of the osseous labyrinth,
showing the vestibule, semi-
circular canals and cochlea.

called perilymph. This membranous bag is at some places attached to the cavity and at some places loose.

The central part of the bag is an oval sac called the utricle.

From this spring three semi-circular canals which lie in corresponding canals of the bone. Near the utricle and in communication with it, is another sac called the saccule and the two sacs together form the vestibule. The canals and the vestibule together form the membranous labyrinth. This labyrinth contains a fluid called endolymph. The auditory nerves enter the bulb-like portions of the semi-circular canals and also pass on to the membrane.

The Cochlea —As the utricle gives off the semi-circular canals, so the saccule gives off a canal containing endolymph called the canal of the cochlea. It is coiled in the form of a spiral of two and a half turns, forming a small cone called the cochlea. It lies in a spiral in the bone and is fixed to the bony cavity. Within the cochlea there are partitions and on them rest microscopic hair-like cells supported on the rods of corti which are like strings of a piano and vibrate in response to a particular note which reaches the ear.

Sound

Sound reaches the ear in the form of vibration of air generated by some vibrating thing. The sound vibrations called sound waves travel in the

air at the rate of 1,100 ft per second. When the vibrations are regular and rhythmic the sound is called musical.

Vibration in the inner ear is caused by the vibrations of the stirrup attached through the anvil and hammer to the tympanum. This vibration sets up corresponding vibrations which travel through the perilymph and semi-circular canals of the cochlea till they finally strike the membrane of the fenestra rotunda or round opening. Vibrations are also set up in the endolymph. These affect the cells of the auditory epithelium in such a way as to give rise to nervous impulses to the auditory nerve and these on reaching the brain excite the sensation of sound.

The semi-circular canals are of service in enabling us to form judgments about the equilibrium of the body and its movements in various directions and positions in space.

The lowest audible note is 30 vibrations per second. The highest audible note varies very much with individuals. Some can hear even 30,000 vibrations per second.

Voice

Voice is produced in the larynx or voice box. This organ is at the top of the trachea, and suspended from the hyoid bones by ligaments and muscles. Voice is produced by the vibrations of the fringe of two folds of mucous membrane called the vocal cords.

The first ring of cartilage forming the voice box is the thyroid cartilage. This cartilage shapes the V-like projection in the trachea which rises up and down in the act of swallowing. The next ring is the cricoid cartilage. It is a complete ring. Sitting on the back of the cricoid cartilage are two pieces of cartilages resembling the pyramid, called arytenoid cartilages. There is a broad band of muscle called the thyro-arytenoid muscle. The diagram shows the position of the vocal cords in the thyro-arytenoid

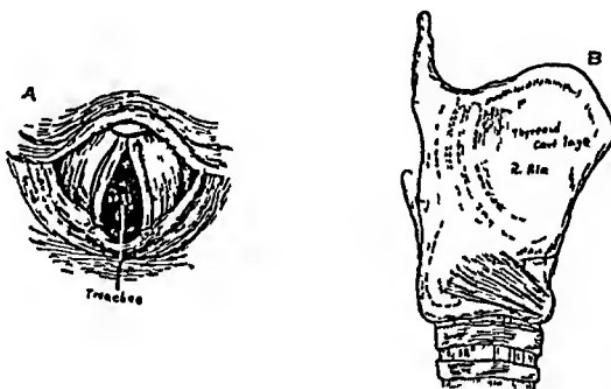
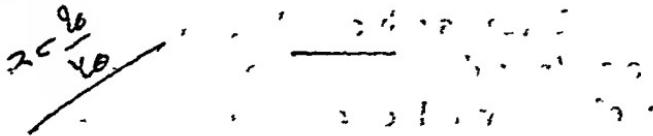


Fig 102

A The larynx or the voice box showing the slit, B Muscular attachments of the larynx (side view)

When the arytenoid cartilages are wide apart the aperture between the vocal cords, has the form of a "V" with the broad part behind. When at rest, the vocal cords take this position. When voice is being produced the arytenoids are drawn together, so the vocal cords become parallel and the aperture narrows down to a mere slit. The vocal cords are tightened at the same time by the crico-thyroid

muscle from the arytenoids. By adjustment of the slots and tension of the vocal cords, with the help of the muscles, proper note is obtained when air is forced through. In this way sound comes out of the mouth. With the help of the lips and tongue, the voice arising in the larynx is modified to articulated speech



THE TONGUE, NOSE, TEETH ETC

The Tongue

The organ of taste is the mucous membrane of the mouth and specially that of the tongue and palate

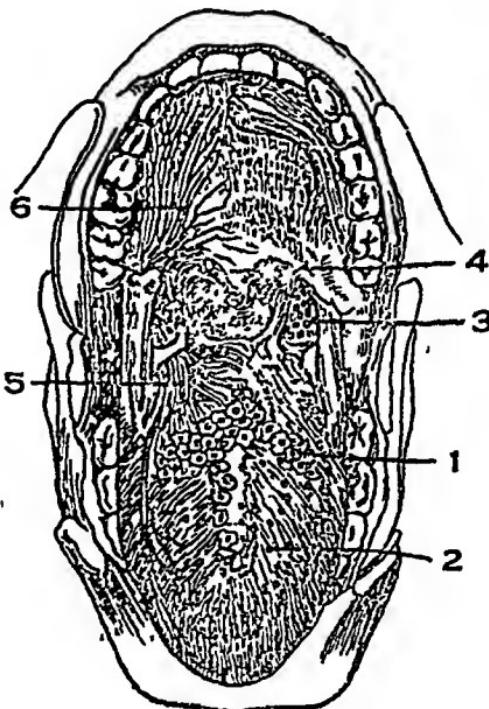


Fig. 103

The tongue showing papillæ

- 1 Circumvallate papillæ, 2 Fungiform papillæ, 3. Tonsil
- 4. Uvula, 5 Glosso-pharyngeal nerve to the tongue
- 6 Branches of fifth cranial nerve to the palate

The tongue is covered by a layer of mucous membrane. It is very thin on the tongue. The

tongue is full of papillæ or protuberances. Some of them are fine like the thread and others are coarse. These are the points through which the sense of taste is arrived at. The papillæ are of three kinds — filiform, fungiform and circumvallate. The filiform papillæ are fine thread-like projections spread all over the tongue. The filiform papillæ get coarser in animals and are sharp horny in carnivorous animals. Their function is not really tasting but carrying sensation of touch.

The fungiform papillæ are larger than the filiform ones. They are chiefly situated at the tip and sides of the tongue. They carry within their cone extremely thin blood vessels and nerves which carry the sensation of taste.

The circumvallate papillæ are arranged in the shape of an inverted "V" on the tongue. These are circular elevations of a twelfth to a twentieth of an inch in diameter. They are seen conspicuously when the tongue is examined. Different portions of the tongue are suitable for judging different taste. Sweet is best tasted by the tip, acid by the sides and bitter at the root of the tongue. Very high or very cold temperature deadens the sense of taste. The ninth

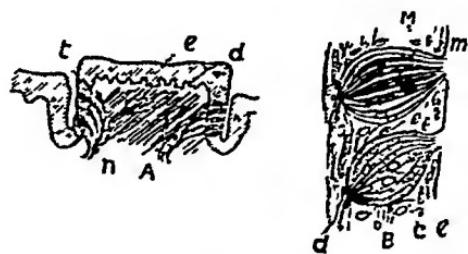


Fig. 104.

The papillæ magnified.
A Circumvallate papila. e. Epidermis. d. Dermis, t. Taste buds, n. Nerve fibres. B. Two taste buds. e. Epidermis, d Dermis c Outer cells, m. Four inner cells with processes at mouth of buds

cranial nerve or the glosso-pharyngeal nerve carry the sensation of taste. The nerve endings enter the circumvallate papillæ.

The Nose

The nose is the organ of smell. The mucous membrane lining the upper part of the cavity of the nose carries the sensation of smell through the nerves. The olfactory or first cranial nerve enters the nose from its roof through a perforated plate of bone called cribriform plate. In each nasal chamber there are three scroll-like bony projections covered by mucous membrane. The upper part of this chamber is the olfactory and the lower part—the respiratory. Most of the air taken in through the nose passes through the respiratory portion only, a small part enters the olfactory portion carrying the sensation of smell. In order that the nerves of smell may be affected, the odorous particles must be presented to them in a gaseous form.

The Teeth

In childhood there are sets of teeth called the milk teeth. They begin to appear from the sixth month and by the second year the whole of the twenty temporary teeth are out.

There are 32 permanent teeth which begin to appear gradually from the 6th year when the milk teeth begin to fall off. Of the 32 teeth, there are 16

on each jaw and 8 on each half of the jaw. On each jaw, the four front teeth two on each side of the middle line are called the incisors. They are shaped like a chisel and are useful for cutting. Next to the incisors on each half of the jaw, is a tooth with a sharp point which resembles the long pointed teeth of a dog, and is called the canine. Next to this are, two teeth with two prominences and two fangs, they are called bicuspids. Next to these are three large teeth with broad crowns and three fangs called the molars or grinders. The teeth are set in the jaw bones to which they are fixed by a cement-like material. The portion of the tooth set inside the jaw bone is called its root.

The portion sprouting outside is called the crown. Tooth proper is made of a material called dentine. It is hollow inside and is filled with a substance called tooth pulp which is a mass of nerves and blood

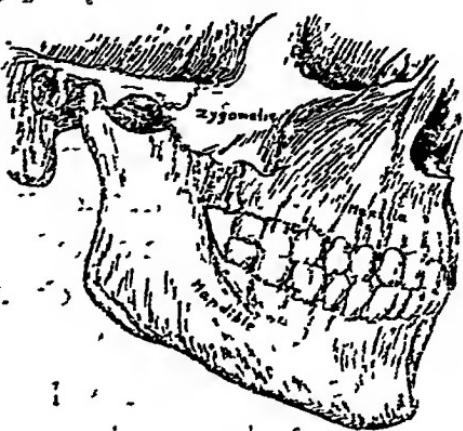


Fig. 105

Lateral view of the teeth and jaws



Fig. 105

The permanent teeth.

vessels The crown of tooth is capped with a very hard and glazy material called enamel which gives the teeth pearly appearance This coating protects the soft dentine. If it is broken or worn away it does not grow again and keeps the soft dentine exposed which is then very liable to decay. We get in this way a carious tooth The decay may continue and result in death of the tooth which then remains as a piece of foreign body in its cavity causing pain, suppuration and further injury to gums

Mastication and Swallowing—Mastication or breaking up of the food is carried out by the movement

of the lower jaw working one set of teeth against the other, up and down in cutting and biting and from side to side in chewing Food is thus broken up, mixed with saliva and collected by the movements of the tongue and cheeks into a mass and thrust into the back of the mouth from where it is squeezed by the muscles on to the pharynx The muscular walls

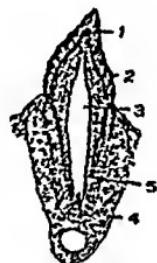


Fig 107.

Section of a tooth.

1 Enamel covering the crown, 2 Dentine, 3 Tooth pulp cavity, 4 Mandible, 5 Cement with bone corpuscles

of the pharynx then contract and squeeze it along the oesophagus, the opening of the larynx being closed by the epiglottis Within the tube of oesophagus, by the same operation it is forced forward into the stomach

The alimentary canal is lined by the mucous membrane composed of cells, which discharge a slimy material and other juices of digestion

Hair and Nail

A hair is composed of horny cells, is formed from the epidermis and springs from the bottom of a deep pit. The pit is lined by the epidermis which forms the sheath of the root of the hair. At the bottom of the pit, the dermis forms a vascular prominence and the epidermis next to the prominence forms itself into hair. As new cells are formed here, old cells formed into hair are pushed out and in this way the shaft of the hair is formed.

A nail consists of epidermis hardened and pressed together into horny plate. Underneath the horny part of the nail, the dermis is full of nerves and blood vessels. This makes the nail to grow.

Endocrine Organs

There are some glands in the body which make and secrete internally some products that influence even the remotest part of the body. These secretions to a great extent, regulate one's personality. These organs are sometimes called ductless glands but there are some glands with ducts which in addition to secretion through these ducts, make internal secretions. These internal secreting glands are called the endocrine organs. The chief organs are thyroid, thymus, suprarenal or adrenal, pituitary and pineal.

The glands secrete. The secretions are very characteristic. A therapy called organo-therapy has been built up and which consists of the administration of the extracts of these glands.

Thyroid Gland — It consists of two lobes lying along the neck on either side of the wind pipe near the voice box or larynx. The two masses on either side are bridged together by a tissue of the same material. These weigh a little over an ounce. They contain a gelatinous substance with a high percentage of iodine

It is an energy-producing gland. It brings about the growth of the body and helps in increasing the

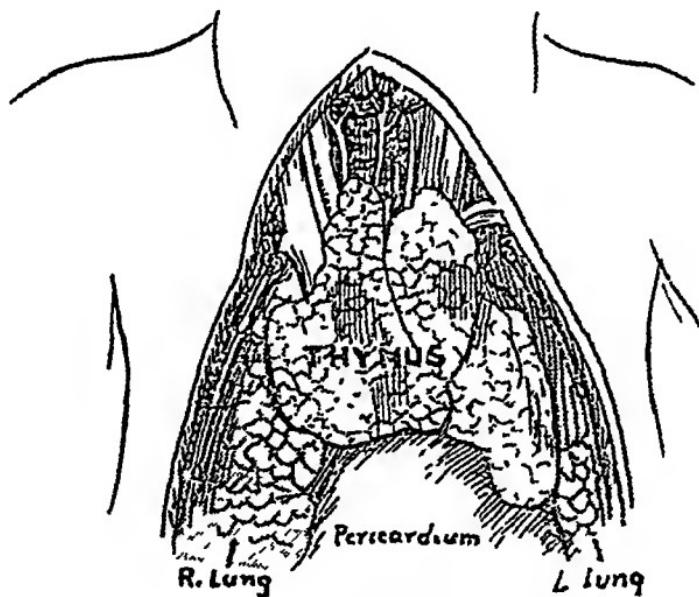


Fig 108
The thymus gland of a foetus

activity of certain cells of the eyes, skin, hair, nail teeth etc. The thyroid is responsible for the normal growth and development of the organism. If the gland fails to secrete then both the physical and mental growth is stunted. The secretion of the thyroid has also anti-toxic properties and insures

resistance against , microbes, bacteria etc which spread the infectious disease.

The thyroid gland has been proved also to regulate the mental activity, the body temperature and the respiratory process.

Pituitary Body :—It consists of a lump of tissues of the size of a pea lying at the base of the brain. The secretion of the pituitary gland (pituitrin) maintains the tone of the tissues and all contracting organs such as the uterus, the bladder, intestines, the stomach, and the heart It maintains the normal blood pressure

Suprarenal or Adrenal Glands :—These are situated just above the kidneys. The secretion from these (adrenalin) plays an important part in the development of the sexual organs and certain mental-growth. They act as a store-house for energy of the sympathetic system The secretion of the adrenal glands into the body bucks up the whole system into activity so that the heart beats more rapidly, the blood pressure goes high, eyes and ears function more clearly, respiration rate is increased and the temperature is raised.

Pineal Gland :—It is located in the base of the brain in a tiny cave near the pituitary body. The secretion of this gland brings in puberty maturing the sex organs, changing the voice, developing the thought and speech and also shyness, excitability etc , which are the characteristics of adolescence The gland is practically dormant in middle or later life

Gonads or Sex Glands

Gonads signify testes in male and ovaries in female. These organs in addition to their external secretion of sperm and ovum also make internal secretion which gives the sexes their respective physical and mental character.

By the removal of the testes and ovaries in males and females before puberty, the following results have been observed :

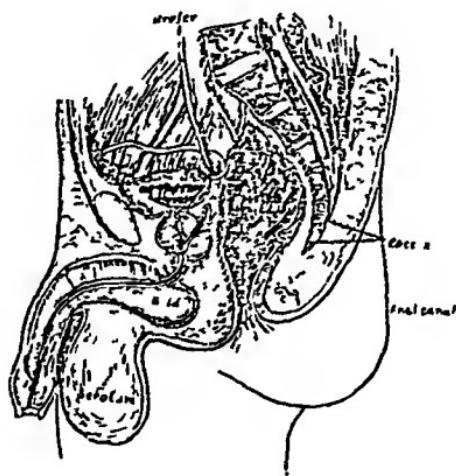


Fig 109

Median sagittal section of male pelvis, showing the relative position of the pelvic organs

In males —The generative organs do not grow, moustache and beard do not appear, voice remains pitched like that of children, muscles get weak, mental condition becomes dull and indifferent and lassitude supervenes all work. The individual loses male characteristics and on the contrary, assumes feminine type.

In females.—The pelvis does not grow, breasts do not develop, hair comes out on the face like males, voice gets hoarse, mental condition becomes inert, the woman loses female characteristics, and tends towards that of male type.

From these observations, it has been deducted that the internal secretions from testes and ovaries play the principal parts in the development of sex characters. In other words the absence of these secretions induces absence of manliness in man and womanliness in woman

BODY, HEAT AND TEMPERATURE

The temperature of the human body is a little warmer than the average temperature of the atmosphere In a hot day or in a cold day, the temperature is the same being 98.6 Fahrenheit This is indicated by the thermometer

The body is losing heat constantly by breathing out the warm air or respiration, by evaporation, by radiation and also by conduction Some heat is also lost with the urine and faeces thrown out by the body To make up for the lost heat, some heat must be produced in the body The temperature remaining constant, it is evident that the heat that is formed is equal to the heat lost

Heat is produced in the body by oxidation When a lamp burns oil, heat is produced The lamp is a machine which takes in oil and burns it producing heat A stove is a similar machine The human body is no less a machine of this type Ordinarily we have to dry the fuel to be able to ignite it and produce heat but the human body is such a perfect machine that it can make combustion possible in the moist condition

So long as the man is alive, his activity continues in some form or other and the combustion which is produced within the body is manifested in the shape of

work done and also partly by the heat that leaves the body. One-sixth of the energy produced is converted to work and five-sixths to heat. The products of combustion within or without the body are ultimately the same or can be easily resolved to the same components. The quantity of heat produced depends upon the sort of food taken. A given weight of fat will produce twice as much heat as the same quantity of carbohydrates or proteins. If the production of heat was the only consideration, then eating anything that gives out sufficient quantity of heat on consumption would be enough. But it is not so.

The production of heat is accomplished in the body through the formation and oxidation of tissues and tissues are formed out of blood. If fat is eaten it must be assimilable and convertible into blood. Thus great caution is necessary in the selection of our food. Vegetables do not give much heat but are indispensable for other considerations. When one organ of the body exercises, there is rush of blood there. There is then more combustion and more heat production. The exercising organ or limb gets warmer. But it cannot permanently remain warmer for the circulating blood takes the extra warmth and distributes it throughout the body which then gets rid of the extra heat by any of the means explained above and the temperature of the organ or limb or the whole body remains normal or constant.

This normality of the temperature is however mainly controlled by the skin. The mechanism of the skin forming perspiration accomplishes this. A

man feels warmer when he is working because the skin is warmer on account of the greater quantity of blood sent to it. When the skin is warmer the excess heat is given off readily by conduction, radiation and perspiration. On a cold day the loss of heat from the body would be much greater if the same quantity of blood were sent to the skin as in a hot day. But it is not so. Cold causes the blood vessels of the skin to contract thereby allowing less blood to be supplied, which checks perspiration and conserves heat. On a hot day the loss from the body due to radiation would be but little, the surrounding temperature being high. But then the blood vessels of the skin dilate allowing more blood and consequently inducing greater perspiration and by this means the heat of the body is got rid of. In cold weather, however, a little more heat is lost than in hot weather, but this is made up by an increase in the production of heat. Cold increases the production of heat, warmth decreases it. This regulation of the blood supply to the skin and also of increase and decrease of heat production is carried out by the nervous system. The centre of producing heat (thermogenetic) lies in the medulla oblongata.

In a cold-blooded animal like a frog or snake this regulating machinery is not operative so that its temperature falls during winter and rises during summer. The cold of winter makes the cold-blooded animal torpid, while the warmth of summer leads to active movement and rapid oxidation.

CHAPTER—II

CARE OF THE SYSTEMS

THE DIGESTIVE SYSTEM

The digestive system comprises of the mouth with the teeth and tongue, the pharynx, the œsophagus. the stomach, the duodenum with its valve, the small intestine, the large intestine, the rectum, the liver with the gall bladder, the pancreas etc..

All these organs help the formation of blood from food which is the ultimate object of eating. But men are apt to forget the ultimate object and become careless and eat only to satisfy taste and hunger. The proper care of the organs concerned is rarely thought of, not before they have gone out of order. It is only then that they call for attention and one runs to a doctor or takes nostrums to set the injured organ or its defective functions to-order. But a wise man should learn to take proper care of the organs while using them.

Care of the Mouth and Teeth

There are the mechanism of the teeth, tongue and salivation for preparing food prior to its entry into the stomach. But men do, oftner than not, look upon the processes of chewing a hindrance and bolt

HOW FOOD IS TREATED, MASTICATION

food as fast as possible to satisfy hunger or save time. The result is that the stomach is forced to receive food in a condition for which it is not designed. When we look to the ruminating animals

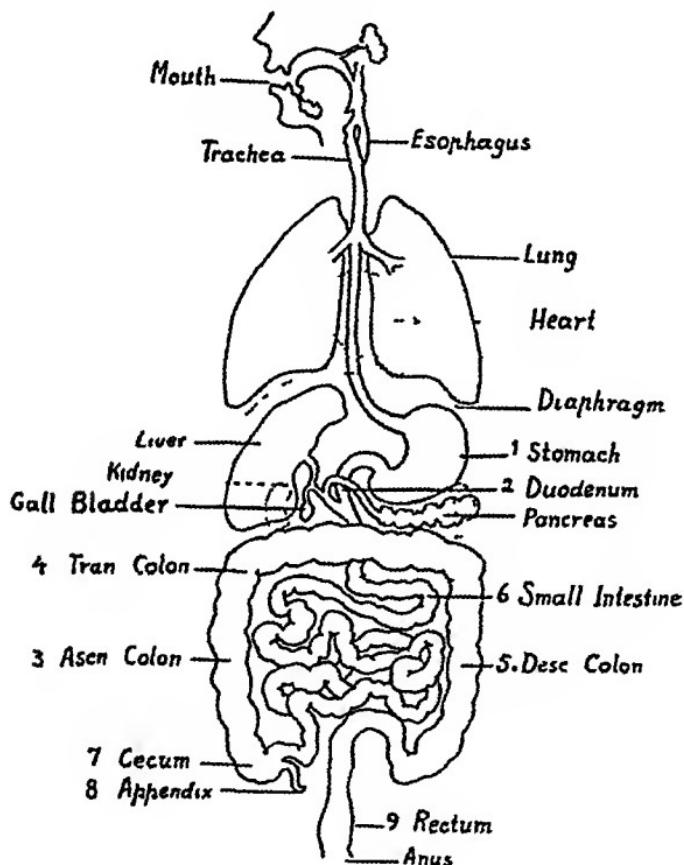


Fig. 110. Thoracic and abdominal organs

- 1 Stomach, 2 Duodenum 3 Ascending colon,
- 4 Transverse colon, 5. Descending colon, 6 Small intestine, 7 Cecum, 8. Appendix, 9 Rectum

we find that they have a pouch to receive food swallowed down hurriedly without proper mastication. This they again draw up into the mouth to chew

CARE OF THE SYSTEMS

properly before sending down to the stomach. Men have no such compartment in the stomach and food swallowed has to be treated by the stomach alone which needs the prior treatment of cutting, grinding, pasting and mixing with a sufficient amount of saliva to be done previously. Therefore the teeth and tongue are to be used properly to get good work out of the stomach and keep it in order. The mouth is called the first line of defence of the system. Chemical, mechanical and thermal irritants are detected here and where possible corrected or thrown out before they are passed on. If any corrosive substance or excessively acid or alkaline substance is put into the mouth, then the unpleasant feeling gives warning and this may be thrown out. By this action the injury is confined only to the mouth and the stomach and other organs are saved. Similarly if any gritty or stony or too hard substance is taken into the mouth, it may be by chewing, made fit for entry into the stomach and if sufficient chewing does not make the mass suitable for the stomach, the bits of hard lumps may be thrown out with the help of the tongue. Then again if too cold or too hot articles are put into the mouth, the temperature can then be brought down near about the normal there and then swallowed. But men are so cruel to the stomach that the first line of defence is often withdrawn leaving the stomach open for entry of whatever is put into the mouth, acid or alkaline, gritty or stony, too cold or too hot. In fact we make habit of drinking

KEEPING THE MOUTH CLEAN

hot tea, milk or water, too hot to be retained for a second on the tongue or in the mouth. We forget that excessive heat or cold sent down the alimentary canal does not help the system, rather injures it. Occasionally the stomach becomes callous by continuous ill treatment and then a time arrives when nature takes retribution. A break-down of the whole digestive system owing to defective operation of the organs follows.

Tartar collects at the roots of the teeth which is composed of secretion from glands and food remnant left over. Such foreign matter helps the accumulation of bacteria. These bacteria are swallowed with food and they may bring about many disturbing conditions in the stomach and affect the system generally. The mouth should be kept clean and in an aseptic condition so that bacterial infection may be least from there. If the teeth are injured, if the gums are bleeding, then these points are selected by the bacteria for their growth. The mouth which otherwise is an instrument of defence, becomes vulnerable to attack and not only helps the enemy bacteria and pus to get down to the alimentary canal but also becomes a culture centre for them. Lost tooth may be replaced by an artificial tooth. If the artificial tooth is not used, selected food should be eaten. Only such articles should then be included in the dietary as do not require mastication, that is, only soft food should be taken, and hard food be avoided. Even those who have lost their teeth

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should keep the food in the mouth and chew it with toothless gums for sufficient time to have saliva mixed with food. Those who take proper care of the mouth and teeth, present well softened masticated food mixed with saliva to the stomach and avoid too cold or too hot food, guard the first defence of the digestive system properly.

The teeth are designed for masticating food. But once the teeth have done their duty, food should not remain in contact with the teeth. The proper place for food to remain is in the stomach and other organs designed to receive and treat them. Therefore if particles of food are allowed to remain in the teeth, then ultimately the teeth and the gums also get injured. Just as particles of dust cause irritation and injury to the eyes similarly particles of food left over in contact with the teeth, irritate and injure the teeth. Only the teeth are less sensitive than the eyes and therefore they require time before the injury is felt. Food left over in contact with the teeth rots there and produces fermentation which attacks the gums and enamels of the teeth. The gums get swollen and pus forms there or the teeth enamel being eaten away exposes the dentine which is then much less able to resist the effects of rotten food. The teeth decay and dental caries occurs. When the dental substance is once attacked by rotten food the injury induces progressive destruction of tooth-substance until the pulp cavity is exposed, resulting in toothache and ultimate

DENTAL CAVIES, PYORRHœA

destruction of the tooth When rotten food material injects the gum, there is inflammation and formation of pus Intake of septic material from the mouth may lead to infection of the pharynx, the larynx and the lungs Chronic bronchitis may also result from oral sepsis When pus forms in the gums, we call it pyorrhœa Most of the pus that is constantly being formed in the gums, finds its way into the stomach The quantity of pus thus daily swallowed may be very considerable During the day the pus and bacteria developed in it may be diluted with food and get destroyed by the action of hydrochloric acid in the stomach. But when there is no food in the stomach there is no secretion of acid Pus and bacteria from the teeth which are continually swallowed may then infect the stomach and intestines Then all sorts of diseases and disorder of the stomach and consequent derangement of the whole system follow And when sepsis has led to disease in other part of the body, the matter becomes very serious.

Animals keep their teeth naturally clean But somehow men fail to keep their teeth as clean as animals do At the end of each meal some acid substance such as sour fruits should be taken If fruits containing acid are taken at the end of meals, then the acid helps to keep the teeth clean The acid excites the flow of saliva which is alkaline and which neutralises the acid and thereby prevents it from damaging the teeth A quantity of water should be drunk at the end of a meal to wash away the mouth

CARE OF THE SYSTEMS

and then the mouth should be cleaned with water by forcing it several times through the teeth. Food particles that may still lie in the teeth, should be rubbed out with the help of a tooth stick or fingers. Those who find that the mere use of tooth stick or fingers can not take out remnants of food from the teeth, should use tooth-pick and clear out refuse materials from known places and then again thoroughly wash the mouth.

Care of the Stomach

After having passed through the first line of defence, the food now reaches the stomach which is the second line of defence. The stomach exudes an acid juice called the gastric juice. If any rough particles are carried with the food, if too corrosive or too hot or too cold substances are eaten, they come in contact with the mucous membrane of the wall of the stomach and adversely affect it. Hard bodies may tear away the membrane while corrosive substances corrode the surface or hot liquids scald the surface and cold liquids interfere with the flow of juice. But the stomach is such a well-built apparatus that it will endure much rough usage and continue to give us service. The more silent service we get, the more careless we are however apt to be, till warning comes to us in the form of a disease such as acidity, pain, gastritis or ulcer in the stomach, vomiting of blood etc. The stomach is so well adjusted to the

MALTREATMENT OF THE STOMACH

exigencies of ordinary life that 80 per cent of the healthy people are likely to reach old age without ever suffering from any chronic gastric disorder. Temporary excesses give rise to complaints which with a little care, the stomach heals and goes on functioning apparently as if nothing had happened. But those who continue maltreating it have to suffer. Imagine the maltreatment, men daily subject the stomach to Boiling water that scalds, if kept a few seconds on bare skin, we sip down daily leaving the stomach to bear it as best as it can. Many persons are generally so inconsiderate to this important organ as to eat their last meal just before they retire for rest. As a result of this when all the organs of the body are enjoying rest, the stomach and its allies are awake and busy in digesting the food and making blood out of what has been put into it. People behave as if all the limbs require sleep but the stomach does not need it. Yet the poor stomach rarely revolts. Then again, look at the blistering spicy stuff that are eaten. Mustard that will ordinarily raise blister on the skin, chilli which no organ can bear with impunity, we throw in the stomach daily. If there are complaints, we stifle them by carminative and other palliative nostrums which do away with the immediate distress. But the weakness persists. A weak stomach means a weak system all over, for the stomach is the feeder of all organs. This important organ is called the second line of defence because it will not allow injury.

CARE OF THE SYSTEMS

to travel down to the other organs that lie beyond. It also very successfully guards the system against invasion of bacteria through the mouth. We may eat food contaminated with bacteria or there may be sepsis and consequent accumulation of pus in the mouth or the nose and bacteria from these sources may contaminate the food and find entrance into the stomach. The stomach produces such a flow of acid on receiving food that the bacteria are killed here. Thus bacterial infection through the mouth is automatically rendered harmless in a normal stomach. But if on account of misuse or organic defect the stomach is not properly working, then the bacteria grow and multiply in the stomach itself or pass on to the organs below in a live state. For the preservation of health against the attack of innumerable bacteria, it is necessary that the stomach should be preserved in a fit working condition. Care of the stomach ensures care of the several important organs connected with it. An irritated stomach will discharge food improperly digested into the duodenum or to the intestine, and thence to the colons. Irritation may set up in any of these organs on account of the primary flaw of the stomach, involving inflammation, bacterial infection, suppuration of these organs giving rise to more or less severe consequences.

Proper quantity of water should be taken for the functioning of the digestive organs. If too little water is taken with meals, the stools will be hard and

INTESTINAL PARASITES

have an obstructed flow or delayed discharge through the rectum. The defecation or evacuation of the bowels is a normal operation, yet slight irregularities are apt to upset it. The child is taught to attempt to evacuate when he is placed in a particular position at a particular time. The reflex muscles get accustomed to it and then without effort, the desire to evacuate appears and the evacuation takes place. But if the hours are changed or if due to false modesty, the call of nature is not obeyed, the result is accumulation and upsetting of the delicately tuned system. This reflex action is so delicately adjusted that in some persons even the change of the familiar commode and surroundings will upset the operation. The upsetting of this system may again adversely affect all the connected organs.

Disturbance of the digestive system most commonly manifests itself in the form of constipation or diarrhoea. If food taken does not pass out within 24 hours, it is to be known as slow action of the bowels. But it will be called constipation, if it does not pass off within 48 hours. On the contrary, a quick passage of food material through the intestines is called diarrhoea. The system should be so regulated that there should neither be constipation nor diarrhoea. Observance of the rules of health and the taking of proper food, drink and exercise go a great deal towards keeping the system free from these diseases.

Intestinal Parasites :—Besides risks of contamination of food in the mouth by bacteria, there is another

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risk Eggs of worms may find their way into the stomach with food and water. Tape worms, round worms and hook worms do considerable injury to man. General cleanliness about food and water minimises the chance of their entrance into the human body They are generally excreted out by human beings or other animals The ova of these worms then find their way into man through eating of food or drinking of water containing the eggs . Eating of unwashed raw foods, fruits and leaves and improperly cooked meat containing the eggs, sometimes liberates the eggs in the stomach or intestines where they multiply.

Once these parasites get lodged, it is difficult to dislodge them Some of them will eat into the liver making it unfit to function duly. Some will enter the gall bladder and obstruct its passage or interfere with the secretion of pancreatic juice In each of these cases they do serious damage to the body and cause diseases while some only cause annoyance, others are more serious. Nothing but rigorous observance of rules of cleanliness with regards to food, drink and bath can protect men from their attacks.

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THE RESPIRATORY SYSTEM

All the respiratory passages are covered with the mucous membrane An inflammation of the mucous membrane is of the catarrhal type. It gets swollen and there is a profuse flow of mucus Catarrh or coryza is an inflammation. It is infectious and is of bacterial origin. The offending bacteria are probably always present in one portion or other of the nose Any predisposing cause gives the bacteria opportunity to begin offensive attacks. Persons are generally immune to bacteria if they are present in smaller number in isolated colonies Appearing in the form of catarrh, the inflammation may affect the nasal sinuses Infection is conveyed by the secretion and also by contact Droplets may be sprayed to other persons, viz, by talking, sneezing or coughing or the secretion may contaminate articles of food. Catarrh leads to influenza A little precaution during mild attacks prevents serious developments. The seat of infection is the nose and if this is kept washed with thymol-alkali solution, then there is less chance of serious developments In several cases the infection extends deeper into the respiratory structures and causes bronchitis and pneumonia When the inflammation occurs in the mucous membrane of the bronchial tubes, it causes bronchitis and when pneumococcus bacilli get lodged in the lungs causing inflammation, pneumonia develops It is a serious

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disease. The inflammation runs its course and may turn out to be fatal or end in recovery but it leaves the patient weak and susceptible to further attacks of pneumonia or other lung diseases.

It is really the resisting power of the respiratory system that can save persons from attacks of various respiratory diseases

Dust is in the air. It gets into the nose, throat and lungs and causes inflammation. The bacilli of pneumonia, bronchitis, influenza and catarrh are all in the air we inhale. Mere presence of these does not matter. But when the organs lose their resisting power, these assert themselves and cause mischief. It is true even of such a fatal disease as tuberculosis of the lungs. The tubercular bacilli are in the air and dust of towns and crowded places. They get easy entrance into the lungs where they get lodged. The tubercular bacilli are transmitted from person to person, largely by contact. Contact implies mingling together of sick and healthy persons but does not necessarily imply actual touch. The transmission may be through objects of common use or it may be through droplets sprayed into the air during coughing or talking. It may also be conveyed by dust containing dried sputum on floor, contaminated food or soiled fingers. The bacilli may be carried by flies. In cities at least, probably no individual passes a week without being exposed to tubercular infection. "From 60 to 90 per cent of all persons dying from diseases other than tuberculosis show in their lungs small areas where the infection

BENEFITS OF DEEP BREATHING

had at one time developed and has been arrested From results of tuberculin test, it is estimated that 90 per cent of all children are infected before reaching the 12th year."

But this information instead of upsetting us should make us see things in proper light. The bacilli, whole host of them, are already there The way to live in health is not by ignoring them but by so caring for the organs that these enemies may not flourish or take the upper hand in the system We should strive to make our system immune to these bacilli Exercise of the organs and their hygienic care are all that need be taken By exercise we may keep the air passages and the lungs healthy and immune from bacilli We naturally enjoy such immunity, otherwise 90 per cent of men would have developed tuberculosis This natural immunity is to be further developed.

Heredity has nothing to do with these diseases not even of tuberculosis, but only contact more or less intimate that counts in the development of these diseases The mere presence of a few bacilli may not develop into an attack but their presence in large numbers and frequent exposures count towards breaking down the immunity

Deep breathing is one of the methods by which the respiratory organs may be developed Deep breathing has the additional advantage of putting in extra oxygen into the blood and therefore of securing richer tone for the blood, which means an offer of richer material to the tissues to consume.

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The average person at rest can, after taking a single deep inspiration, hold his breath for 30 seconds to one minute. If instead of a single inspiration a series of very deep inspirations and expirations are made or the so called forced breathing done for 1 or 2 minutes and with the last inspiration the breath is held, it can be so held for a period of 2 to 4 minutes. To produce this result the forced breathing must be real. There is a tendency after the first few breaths to curtail the amount of air moved. Forced breathing brings into the lungs a greater volume of air than is required to dilute the carbon dioxide produced in the body during the time. By practising the forced breathing and with last inhalation filling the lungs with oxygen, the breath can be held for 6 to 8 minutes and the record is of over 13 minutes. The yogis far exceed this limit.

The theory of healthy development of organs lays down exercise as the first and foremost method. If the biceps muscle is to be developed it has to be worked or exercised. Similarly if the respiratory organs have to be developed they have to be exercised. Deep breathing is one of the most useful and convenient exercises for the respiratory organs.

For a healthy respiratory system the nose and the mouth have to be kept clean, the nails and cloths to be kept free from bacteria and food is to be cooked, served and eaten in a manner which is most conducive to the avoiding of contact and contamination; working places and sleeping rooms are to be well

EFFECTS OF SUN'S RAYS

ventilated and free from contamination. But these are not enough. Sun, the great steriliser and life-giver has to be given the proper place in the hygienic care of the respiratory organs. Persons in crowded tenement houses, workers in cellars and in poorly ventilated rooms and persons addicted to alcohol are particularly prone to these diseases. "An experiment performed by Trudeau shows clearly the relation of environment to the development of tuberculosis. He found that rabbits inoculated with the T. B. bacilli and then confined in dark damp places, without sunlight and fresh air rapidly succumb, while other rabbits similarly inoculated but allowed to run wild did not develop the disease. The occupants of prisons, asylums and too often of dark ill-ventilated workshops, are in the position of Trudeau's first group of rabbits, for they work under conditions most favourable to the development of the bacilli which have lodged in their bodies" (H W Haggard). What is true of tuberculosis is also true of the other diseases of the respiratory organs mentioned already. A prominent bacteriologist says that he had the sputum of a confirmed tubercular patient containing a very large number of bacilli exposed to the sun for 6 hours, by which time it dried and became crisp. On being examined the sputum was found free from bacilli. The value therefore of sun's rays in keeping our body, clothing, beds and rooms free from various bacilli cannot be overrated.

THE CIRCULATORY SYSTEM

The Heart as a Pump.—The heart is a pump connected at its force end with arteries and at its suction end with the veins. This comprises the circulatory system. The heart circulates blood through the arteries to the tissues and receives it back through the veins. Blood is so important to the life-process that momentary stoppage of the blood-pump or the heart means death. The whole system is bathed in blood. The heart which is a pump of most wonderful mechanism, keeps by its action every nook and corner of the human body soaked in an ever-flowing stream of fresh blood. This blood stream, which builds the delicately complicated machinery of the various organs and the frame of the body, also keeps the body in continual repair and supplies it with a reserve against emergencies. The arteries carry the blood to the various parts dividing and sub-dividing into such minute tiny pipes that one can hardly see them with the eyes. When the blood passes through these capillary tubes with the thinnest possible wall of membrane it allows itself to be absorbed by the organs in such measure as may be necessary to build or maintain each organ. It is to these capillaries again that the blood carries oxygen from the lungs. The capillaries give it to the tissues and receive in

WORK DONE BY THE HEART

exchange carbon dioxide which the blood keeps dissolved in itself. In these capillaries again the blood receives the other waste products of the body which it carries for rejection by excretion through the kidneys, skin and lungs.

The work which the heart is called upon to do is a tremendous one. The human body contains 10 to 15 lbs of blood only. Every minute this entire quantity of blood completes one course of circulation. It means that a drop of blood pumped out by the heart into an artery at the commencement of the minute has to go to the end of its channel to perform its work and return back to the heart at the end of the minute. What a powerful gushing stream it must be, which is travelling at the rate of a gallon per minute through the innumerable capillaries in the body, repairing, maintaining, building and draining the whole system.

Work done by the Heart —The pump which performs this function of forcing a gallon of blood per minute, is again of the most wonderfully perfect construction. It has no cylinder and no piston. The body of the pump itself dilates to receive the blood and squeezes itself to force the blood out of it to the arteries, capillaries and veins. The resistance against which the heart as a pump normally works is equal to a column of 6 ft of water. This resistance it has to overcome. On calculating the work done every day by the heart, it is found that it is equivalent to the labour done in lifting a man to a height of 500 ft in

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course of a day. The heart performs this duty. We know of no human-made pump that can do so much work in the stipulated time consuming so little power and weighing only 8 oz as the heart does.

Regulation of Blood Supply.—But the normal work of the heart is frequently disturbed. The heart has to do more work when we have emotion, when we are excited, amused or angry. These emotions call forth more blood to be sent out to the affected organs. But where is this blood to come from? Indeed, the sum total of the quantity of blood circulated is constant. Therefore if the heart is to answer a call for more blood it can do so in two ways either by increasing the calibre of the arteries or by increasing the pressure of the blood in arteries. When we take food the stomach requires more blood. The brain orders the arteries of the stomach to be dilated, that is, the bore of the pipes is enlarged. Therefore more blood flows through the enlarged channels and correspondingly less blood goes to other parts. Again as an instance of increasing pressure of blood or pumping more blood in a given time, we may observe that when a person is angry, at once the heart begins to pump at a quicker rate, preparing itself for the emergency of putting forth extra physical energy. Excited people talk loudly and the heart sends more blood to the vocal organs to enable them to perform their duty. The call for extra energy is answered by the brain automatically and involuntarily.

BLOOD PRESSURE

Regulation of the supply of blood by constriction and dilatation of the arteries is constantly happening. When a man is alarmed, blood vessels of his face are constricted. Less blood goes there. The man looks pale. But when a man is ashamed, the blood vessels of the face get dilated and more blood rushes to the face. The result is blushing. When a man is doing severe mental exercise blood is supplied to the brain at the cost of extremities, where cold is felt.

Exercise after taking food is injurious to health because when more blood is necessary for digestion, the exercised limbs make a further call for blood which has to come to these limbs at the expense of the digestive organs of the abdomen. The result is poor digestion and consequent poor health.

Cold causes the vessels of the skin to contract. A little rubbing or massage produces heat, the blood vessels then dilate and more blood comes to the skin which removes the feeling of cold.

Sudden constriction of the arteries feeding the heart tends to stop the heart and produces an intense pain known as angina pectoris. The arteries in this case are in spasm. If a suitable vapour is inhaled, a dilatation of the blood vessels is produced when the blood pressure falls and the pain is relieved.

The secretion of the adrenal glands (adrenalin) causes blood pressure to rise. During excitement the adrenal glands make larger secretion and blood

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pressure rises. If due to disease the adrenal glands cease to work, there is a fall of blood pressure. In such a case if the adrenal gland extract is kept under the tongue for absorption, then blood pressure automatically rises.

There is another factor which determines blood pressure. If a man is exercising, more blood goes to the exercised limbs. It is that some blood goes to meet the call of exercised limbs and the blood vessels of other parts get constricted and demand less blood. With the exercise there is more rapid oxidation and a hunger for larger quantities of air, which causes quicker respiration and therefore quicker pulse which raises blood pressure even compensating for the larger supply to the exercised limbs. It is therefore that in exercise blood pressure rises.

The position of the body also influences the amount of blood pumped by the heart. 15 to 25 per cent more blood flows while sitting than while standing and again 15 to 25 per cent more blood flows while lying down than while sitting. There is a great deal of difference between standing and walking. People feel much more fatigued to have to keep standing than walking. Therefore sentries on duty or persons waiting on legs are seen to walk slowly about. We have seen that 30 per cent less blood flows while a man is standing than while he is lying down. This lesser supply of blood tells upon the brain, because it receives shorter supply than what is necessary. The slower supply of blood to the brain

BLOOD PRESSURE . FATIGUE ON STANDING

creates uneasiness Cases of persons fainting while standing are not rare This is due to reduced blood supply to the brain But if, instead of standing, one walks about there is a call made on the heart for a greater supply of blood to the exercised limbs This makes the heart beat faster, and this not only compensates for the inadequate supply to the brain and other limbs due to standing, but also satisfies the demands of the exercising limbs. Therefore walking is found to be less fatiguing than standing School teachers who are in the habit of punishing boys by making them stand-up should know that they inflict more severe punishment than they intend to do.

It will help persons to avoid accidents, if it is remembered that all too sudden a rise from a recumbent position induces dizziness, headache and even blindness in certain persons, because at such a moment there is diminished flow of blood through the brain owing to the failure of the brain to warn the heart to instantaneously make up for the higher blood pressure required The heart in such cases unduly lags behind the necessity of the moment.

Ordinarily the heart is capable of pumping 10 to 15 pounds of blood per minute or rather it completes one circulation in a minute But it may, if called upon to do so, beat so fast as to do three times its normal work. This great reserve power helps men to carry through extraordinary strain on occasions But when the heart is weak or for some reasons being diseased, it fails to respond, then utmost care

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should be given as to what a man does and how he lives. Every day one may be called upon to do some sort or other of extra work. If the heart is weak or irresponsible, then it will fail to supply the requirement and the result will be less blood in the brain causing swooning and the stoppage of the heart or heart failure.

Heart failure is a common cause of death even in apparently healthy persons. Its meaning is that the heart failed to meet the call for extra work at the time of need and consequently collapsed. It is necessary to so regulate the activities of persons, that no greater demand on the heart is made at any moment, than it is capable of meeting.

High Blood Pressure

We have seen that in order to meet exigencies, the heart has to perform harder work. When the brain or other limbs are working, blood has to circulate under pressure. The strain may injure the blood vessels if continued for a long time. Again with age, the arteries get thickened and lose their elasticity. Sometimes calcium salts deposit on the walls of the arteries, and reduce their bore. The difference between a healthy artery and an inelastic artery is similar to that between a new and a stiff old rubber tube. If pressure is put on the stiff old rubber tube, it will break. Similarly persons whose arteries have become stiff on account of high blood pressure, live

HARDENING OF ARTERIES APOPLEXY

always in a danger zone. For according to the nature of work, there is always a call on arteries from time to time to accommodate the passage of more blood and if the artery is inelastic, it will burst. If the bursting occurs in the brain the result is apoplexy, paralysis, even death. For living in health, high blood pressure whether by over-exercise of body or mind has got to be avoided. Those persons who have got mental equipoise, are not easily excited and live normally as regards bodily exercise, need not fear hardening of arteries or unhealthy blood pressure. But sometimes entire families develop hardening of arteries at an early age, on account of poor quality of tissues. This can be only explained on the ground of inheritance.

It is a matter of common knowledge that exercise of any organ or tissue strengthens and enlarges that organ. It is the same with the heart. Athletes have larger heart. If a person who has developed a large heart gives up exercise, the muscles of heart deteriorate and it is possible that they may soften and become easily susceptible to disease. It is necessary that when once an organ is developed it should be sought to be maintained in that condition.

The arteries are also affected in quite another way. An obstruction may develop at any point in the artery. This may be due to an injury on account of which blood has clotted or it may be due to some disease which induces a growth. Such obstruction means

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greater work for the heart and consequent raising of blood pressure. Any obstruction—a clot or particle or a foreign body whatever it is, is called an embolus. It gets into the blood stream and may get into a capillary tube and remain stuck up there. There will be no further mischief, for blood will flow through the nearest channel. But if it gets into the brain, it may cause paralysis, loss of speech, memory or some such serious troubles.

A lot of trouble in the circulatory system arises from defects in the digestive system. If there is wind in the stomach or if it is otherwise irritated, it interferes with the smooth working of the heart and lungs. What apparently is a heart or a lung trouble may really originate in the abdomen. If there is indigestion it affects the circulation in one way, if there is constipation it affects the circulation in another way. Constipation positively sets up obstruction in the flow of blood, the result being raising of the blood pressure, headache etc..

Difficult or prolonged defecation similarly causes obstruction in the veins of the rectum. Local exposure of the veins of the rectum may cause thrombosis or clotting of the blood. The veins then swell and are bluish in colour. The points are tender and painful. They sometimes protrude and are apt to bleed. It is then called piles. Persistent haemorrhage from piles may lead to anaemia. Relieving of constipation and improvement of general health will cure these troubles.

AFFECTED BY INDIGESTION AND LEAKY VALVES

Proper working of the heart also depends upon the vagus nerve which serves the heart, lungs, stomach and intestines Any nervous irregularity in centres served by the vagus nerve may affect the heart When the stomach or the intestines are struck by a blow, nerve impulses are sent to the vagus centre and through a reflex action, the heart may be influenced The effect of such a blow is the slowing down of the heart and if the blow is sufficiently severe, the heart may stop resulting in death

The valves of the heart shrink or go out of shape on account of diseases mainly due to inflammation of the inner surface of the heart. On account of acute inflammation, caused by bacterial infection, the valves of the heart may develop open sores or have growth on their surface or get eroded or distorted out of shape In all these cases, the heart has to do more work to compensate for the leakage or obstruction in valves The heart can perform three times its normal duty in cases of need With obstruction or leakage, the heart may have to do more and more work and in extreme cases it may have to do three times the work for maintaining normal activities Then there will be less and less or no reserve margin left for getting extra work from the heart for exigencies It is difficult to restore distorted or worn out valves to the normal condition. A person therefore suffering from diseases of the valves, should be careful about all his movements, know his limits and restrict his activities accordingly.

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Shortness of breath after moderate exertion is usually the first symptom of valvular diseases. When the heart fails to circulate blood properly the legs begin to swell. This occurs also in kidney diseases. It is known as dropsy. By the circulation of blood, the fluids in the tissue spaces are exchanged with the blood. When the circulation is sluggish, the fluid tends to accumulate in the lower portions of the body because the pressure in the veins is greatest there. These fluids may be drained off by purging and the heart given an opportunity to serve the parts and maintain the balance between accumulation and draining.

Pulse Rate :—The muscles of the heart have the special property of automatically and rhythmically contracting and relaxing of their own initiative. The heart, if it be removed from the body, kept warm, and supplied with a nutrient and oxygenated fluid, continues to beat. The heart depends on the vagus nerve for controlling action on its working but not for continuation of beating. If the controlling action of the nerve on the heart is removed then the heart begins to beat very fast. The effect of strychnine or nux vomica on the system is to minimise or remove the control of the vagus nerve. The heart then begins to beat fast. On the contrary, the stimulation of the vagus nerve slows down the beat of the heart and in extreme cases, as in a blow on the stomach, the heart may cease to beat altogether, the restraining action of the excited vagus nerve having gone to the extreme.

SALINITY OF BLOOD

The rate of pulse per minute at different ages is as follows —.

At birth	130—150
1—2 years	110—120
2—10 ,,	90—100
10—14 ,,	80—90
Adult	72

Care of Blood

The whole human system has been built out of blood which necessarily contains all the elements found in the body. This very necessary substance is however so cleverly supplied to the body, that only the minimum quantity is at any time circulated. This is accomplished by the mechanism of the heart. In nature, unicellular organisms live immersed in water. Through the surface of the body they absorb food and oxygen from water and return carbon dioxide and other wastes to the water. It is an essential condition of their life that they be surrounded with water, rather salt water, for it is in sea that they live. The ocean of salt water makes it possible for these organisms to live. The case of man is not far different. As in the unicellular creature the particle of life-structure is bathed in salt water, so in man the tissues are bathed in saline blood. The salinity of blood equals to the salinity of sea water. Only in place of a large volume of stagnant liquid, for our

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purposes, we have saline liquid or blood rushing past every tissue and every moment feeding and receiving the refuse material. In the unicellular life the surrounding water receives the excreta but in human system the saline blood receives and discharges it by some organs, itself remaining pure. But the quantity of circulating blood is every minute diminishing on account of its being converted into tissues of the body. This deficiency is being continually met from the food we eat. When we eat food, a portion becomes blood and is mixed with the blood stream forthwith, while a portion of food material remains in the liver as a reserve to make up blood deficiency at call, when we may not be eating. The haemoglobin of the red corpuscles of blood, when exposed to the air absorbs oxygen and is converted into oxyhaemoglobin. This reaction occurs in the lungs by contact of air with blood which has returned through the veins after having fed the tissues.

The red corpuscles are contained in delicate sacs or sponge. If the corpuscles are taken out of the plasma or surrounding fluid and put into ordinary water, the corpuscles burst. They need a saline medium containing about 0.9% common salt. When due to any disease, the sac containing the haemoglobin bursts, the red matter comes out and passes through the urine and gives it a black colour. A severe type of malaria in which the blood is thus split and passed out through the kidneys is called black water fever.

SALINE INJECTION

Saline Injection —When for any reason the quantity of blood in the system is diminished, the system cries for water. This is why cholera patients feel so thirsty and also persons who have bled profusely. The extreme distress of wounded soldiers due to thirst is well-known to readers of history or war stories. If water is given by the mouth, thirst is allayed, for water after absorption of necessary salts, passes into blood stream making up for the loss of blood for the time. A better way is to inject salt solution into the veins. If plain water were injected into veins then haemoglobin sacs would burst and cause further depletion of the already depleted stock of blood. The salt contents of the water injected are invariably a little greater than the salt contents of blood. Roger's hypertonic saline injection has proved a most valuable remedy in cholera.

Saline injection helps us to tide over emergent difficulty, but it can never do the work which the blood does for any length of time. The right quantity of blood with due proportion of red and white corpuscles is necessary for the maintenance of life. When there is a diminution of red corpuscles, the blood cannot serve the purpose of maintaining the body and the resulting condition is called anaemia. Anaemia literally means lack of blood. But it really means want of red corpuscles in the blood. Anaemia may be caused by an excessive destruction or insufficient formation of red cells. A loss of red cells acts as a stimulus to their formation in the marrows of bones. But

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the loss may exceed the system's capacity for recuperation. Many toxic substances generated within the body by food, bacteria or worms, cause destruction of red cells. Thus if hook worms infect the intestines, their bites cause continual loss of blood through slight haemorrhage. In addition to this, blood is destroyed by toxic substances secreted by these worms.

While the red corpuscles supply iron and other food materials to the tissues, the white corpuscles which are comparatively few remain in blood to safeguard blood and the system against attacks. The white corpuscles are generally described as fighters, which they really are and they are of the bravest type, for it is their normal function to die fighting against infection and injury both external and internal. When they die, the dead corpuscles form the pus.

White cells are kept stored in lymph glands and may be called out for service when required. Indeed, the sparsely scattered white corpuscles in the blood stream may be likened to sentries, and those contained in the lymph glands are reserves. If the bacterial invasion is local, the reinforcement is called to the particular spot where it is required. For example, when bacteria enter the tissues through a cut or scratch in the skin, white corpuscles appear there, fight the bacteria, absorbing them within themselves and some may die in the attempt. So long as this fight goes on, white cells continue to

ACIDOSIS AND ALKALOSIS

come and the dead corpuscles form the pus. Wherever there is pus, it is indicated that there is bacterial infection. All forms of bacteria however are not sought and fought out by the white corpuscles. If it were so, then some of the injurious bacteria would not have been so harmful as they are. Once the corpuscles are dead and become pus, they become the habitation and carriers for bacteria.

Transfusion of Blood — When there is a shortage of blood supply in the body it may be naturally thought that an injection of some other person's blood may do good. Researches and experiments in this direction however show that the red cells of the transfused blood live only for a short time in the new host. The corpuscles are destroyed in the liver. Transfusion of blood is therefore designed to tide over an emergency. The blood of animals cannot be transfused in man for the different bloods react and their cell walls burst or they clot. In certain cases human blood may also react in the same way. This can be determined beforehand by examining a mixture of the two specimens of blood under the microscope.

Acidosis and Alkalosis — Blood is normally alkaline and the carbon dioxide it holds in solution is acid, but blood has more alkali than the acid of its carbonic acid content, so the resultant effect is alkaline. It is a problem to preserve the alkalinity of blood. If one does not breathe for sometime then the quantity of carbon dioxide in the blood

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increases, which means an increase of acid over alkali. The reduced alkalinity is called acidosis. If there be on the other hand alkalinity in excess of the normal then we call it alkalosis. During life, blood can never become fully acid. Even if the diet be very acid still then it has little influence upon the balance of acid and alkaline substances contained in blood. The kidneys keep the blood in proper acid-alkali content. Special diet may help the kidneys in the discharge of their duty to keep the proper balance of acid and alkali in the blood.

Certain diseases produce acidosis. The symptoms then are elevation of blood pressure, and an increased desire to breathe and throbbing of the heart. Ordinarily the kidneys remove the extra acid if any fixed acid has done the mischief. But a diseased kidney may not be able to do so. Alkalosis occurs when there is diminished amount of carbonic acid in the blood. Alkalosis is accompanied by pain in the head, dizziness and lowering of blood pressure. Mountain sickness is mainly due to alkalosis.

The normal blood, besides the body building materials, contains acid and alkali in proper proportion. When there is any deficiency of any material in the blood then such diseases, as are known as deficiency diseases, appear. The body tissues or the muscles, bones and nerves are all built out of blood and they contain different elements and substances in different proportion. The blood must hold all the

PARASITES IN BLOOD

components at all moments When the blood containing repairing materials, goes flowing through the capillaries, it offers itself for selective absorption to the cells and the different tissues are built But if there is any deficiency of any material in the blood that the tissues require, then the tissues are starved, become undeveloped and weak

Health depends upon having the right quality of blood which again depends upon our taking right quality of food, water, air and exercise Care for the blood means taking care of food, water and air and also of circulation by exercise Even right quality of food will not be able to produce the right quality of blood without proper exercise and the working of lungs

Blood as culture medium for Bacilli —Blood is a good culture medium for bacilli and parasites. There is a continual onslaught on blood by various agencies For example, malarial parasites develop in a kind of mosquito These mosquitoes while biting a person, inject saliva in order to prevent the blood clotting while they are sucking Malarial parasites are present in saliva of mosquitoes They enter the human body and multiply producing millions of parasites within the host These parasites cause illness which we call malarial fever Similarly filarial parasites in embryo enter through the mosquito bite and live in hundreds in a drop of human blood The embryo of hook worm parasite enters the blood stream either directly from the skin or through the

CARE OF THE SYSTEMS

mouth, whence it gets into the blood stream and then reaches the intestines. If water is filtered through cloth before drinking and the body is protected against mosquitoes by use of curtains or by smearing the exposed skin with kerosene oil, then a lot of these parasites may be prevented from entering into human blood. Many persons who are otherwise careful about drinking water and drink nothing but pure, filtered or strained water, do often while bathing in a tank, take a mouthful of water to wash the mouth before ablutions. The embryos of parasites, bacilli and bacteria are ready to catch one unawares. So that if the water contains embryos of plasmodium etc. that infect the human body, they will remain in the mouth and pass down into the stomach or the lungs whichever place suits them. Water not considered fit for drinking should never be considered good enough for washing mouth, or for washing plates on which food is kept, for this is nearly equivalent to drinking.

Snakes, wasps, insects, scorpions and fishes poison human blood by bites and stings. It may also be poisoned by pricks from thorns. Some are painful and produce distressing symptoms and some are deadly.

By taking suitable food and drinking and by guarding against the attacks of parasites and bacilli etc., the blood may be kept pure. But all this is not enough. In order to maintain purity of blood, proper exercise of the limbs, as has been already said, is

EXERCISE KEEPING BLOOD PURE

necessary. The man who neglects to do manual labour and does not take some form of exercise, cannot keep his blood in a pure condition. Exercise of the limbs is also a condition of keeping the blood properly oxygenated and healthy.

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THE NERVOUS SYSTEM

Care of the Nervous System

The health of the whole body depends upon the tone of the nervous system and the health of the nervous system depends upon the health of the organs. The influence of the mind in every sphere of life is large. Mind is the ruler of the nervous system. Man's supremacy over the animal world is due to man's possessing a superior mind. It is due to the mind that man distinguishes between right and wrong. As every organ develops by exercise, so does the brain. The directing capacity of the mind develops by exercise. By doing good, the capacity to do good increases. Right thinking and right action become then matters of habit. In other words, mind is habitually trained to follow these lines. The man is then said to be pure-minded. Similarly by directing the mind to evil, the brain forms the habit of doing evil and becomes criminally inclined.

When a man attempts a change of his life then the entire attention of the mind is required on that subject. Every little handicraft, every vocation calls upon the learner to concentrate attention of the mind on the subject. There is a conscious effort for performing the thing. By exercise the conscious effort gives place to reflex action. Then the work

CONSCIOUS EFFORT AND HABIT

becomes effortless, easy and we say that it becomes a matter of habit. For every formed habit there is a period of training of the body and mind. This is true about work done by the limbs or the organs of senses. It is equally true about the operations of the mind. Thus by mental training a man may acquire habit to be good or bad.

The effect of the mind over health is very great. When the mind is oppressed, depressed or jubilant, its reaction on the body is obvious. Food eaten during a period of anxiety refuses to be digested. The stomach refuses to do its customary automatic work, when the mind is disturbed. Similarly with the disturbance of the mind, the whole system is disturbed. Therefore the mind has to be properly cared for. Mere physical care of the body is not enough. Physical and spiritual care or culture of the mind, amounts to taking complete care of the body which is the home of the spirit that inhabits it. Conversely physical and spiritual ill health upsets the normal working of the mind. The mind therefore has to be taken care of by all means.

During work and even when the limbs are resting, the nerves have to work and serve. They also need relaxation. Sleep gives this relaxation.

The innumerable nerve endings on the skin which are open to receive impression, get much relief on the application of cold. A bath provides the coolness necessary. During and after a bath evaporation of water from the skin, cools the nerve endings.

CARE OF THE SYSTEMS

satisfactorily. The nerves get soothed. The same thing happens in sponging. Baths should be regularly taken in order to soothe the nerves. Those whose nerves are abnormally sensitive and get irritated quickly, would find relief in taking more than one bath. Exposure of the skin to the action of air is also a great factor in keeping the nerves in proper tone. The value of exposure enhances considerably when a current of air blows. Stagnant air brings little relief. A current of air therefore when moderate is exhilarating. It brings relaxation and gives relief from oppressive feeling due to heat or any bodily or mental exercise. Fanning is a simple method of having a current of air on nerve ends. It brings relief. By walking, a current of air is brought to play on the skin, and this acts healthfully on the nerves.

Early rising also exercises a soothing influence on the nerves and is conductive to acquisition of healthy state of the body and mind

THE BONES

Care of the Bones

The bones are the only rigid structures in the body furnishing the framework which supports the tissues. The bones are arranged in definite relation to one another forming the skeleton which gives the characteristic shape to the human body. The central column of the spine is supported through the pelvic girdle on the two legs. The bones of the legs articulate to the girdle. Similarly the upper part of the spine has the shoulder girdle of collar bones and scapulas supporting the two arms. The spine at its lower end has a short piece of bone, the coccyx which becomes tail in animals but has no importance in man. The upper end of the spine is capped by the head with which the jaw bone articulates.

In the embryo, connective tissues are deposited which are converted into bones by drawing deposits of lime about them. The outer layer of the connective tissue forms the periosteum, beneath which a dense layer of bone is deposited. Bones generally consist of two layers, one is a hard mass enclosing the frail spongy bone inside. In long bones, this spongy mass gradually disappears, leaving the inside hollow and filled with fat. The hollow or tubular character is designed to give the bones greater strength with as

CARE OF THE SYSTEMS

little weight as possible If the long bones were made solid and had the same weight as the hollow ones, then they would have been much weaker.

The heads of long bones are formed at first as cartilages. After full growth is attained, these cartilages are converted into bones. In the leg bones the conversion is not complete until about the 18th or 20th year.

The bones may have inflammation as a result of which the affected portion may die, become separated from the living bone and remain in the flesh like a foreign body, requiring removal by a surgical operation In less acute cases as also in tuberculosis of bones, the affected portion becomes soft and porous and is gradually destroyed. This is known as caries. Decay of the teeth is dental caries and it may lead to destruction or caries of jaw bone Chronic inflammation due to rheumatism may cause the bones to thicken leading to deformity and difficulty of articulation. Inflammation may arise from a blow on the bone or from bacterial infection. More often, it results from infection which may be induced by contamination, as in compound fracture or indirectly, the bacteria may be carried to the bone from blood

Fracture —The bones though very strong have limits and when this limit is exceeded the bones break or we have a fracture A fracture does not always take place at the point where the force is applied. In jumping from a higher place, the force is applied at the feet but a bone on the upper part of the legs

FRACTURE SPRAIN DISLOCATION

may break. The bones of the legs are compressed by the force and therefore the weakest portion may yield. Sometimes the end of a broken bone may pass through the flesh and skin. Such a fracture is called compound fracture. Contamination by dirt at the protruding point, necessarily makes such a fracture very risky. Careless first-aid may do more injury than good in such cases. As a rule, the part should be made rigid by splints before removal after the accident. A broken leg may be tied to the opposite leg. Sometimes a fracture becomes compound during the attempt at removal. Utmost precaution should, therefore, be taken while lifting an injured man.

Sprain :—Sudden stretching of the ligaments of a joint may even pull a capsule out of its joint or distort a tendon. This is sprain. It is associated with severe pain and is immediately followed by haemorrhage into the tissues about the joint. Fluids also ooze from blood vessels and accumulate in the tissues, causing swelling. A sprain requires a long period of rest and massage in order that the joint may be restored to the normal condition. A neglected sprain may lead to a chronic pain or permanent weakness of the joint.

Dislocation :—When the bearing surfaces of joints are dislodged from their normal position we have a dislocation. Dislocation may be set right by pushing the dislocated bone back to its normal position. Sometimes the ligaments at the joint are permanently weakened leading to dislocation at

CARE OF THE SYSTEMS

slight strain All unusual pull should, therefore, be avoided at the joints And once a dislocated bone is set, the joint should be given long rest for the ligaments to recover the normal tone and thereby prevent repeated dislocation.

Spinal Curves :—The spinal bone has four curvatures In relation to the front of the body, the spine at the cervical region or, top has a convexity, then there is a concavity at the dorsal, again convexity in the lumbar and a concavity in the sacral. The curvatures of the spine develop with age. The spine of the child at birth shows curvatures at the dorsal and pelvic regions but it is straight at other positions. When the child begins to hold its head upright, then only the curvature at the neck begins to appear

The curvature in the lumbar region develops only when the child learns to sit upright. As the bones are very weak at birth, a child should not be made to hold its head erect before it naturally does so, nor should it be made to sit or stand before the bones become sufficiently strong to withstand the pressure.

Good and Bad Postures —The shape and arrangement of the bones of the skeleton naturally determine the correct position for standing or sitting. In standing when the line of gravity follows the line of body structure, then it is called a good posture In a bad posture a burden is thrown on the muscles and ligaments, because of the exaggerated curvatures of the spine.

GOOD AND BAD POSTURES

In an incorrect position either while standing, walking or sitting, the ligaments which normally check extreme ranges of motion are constantly under tension. These become overworked and get quickly fatigued. The skeleton possesses great resources for compensation to improper posture, so that the damage becomes apparent only after a long period of misuse.

The following sketch shows the correct and incorrect postures of standing in skeleton —

Back-ache, lumbago, leg-ache and disturbance in the digestive and urinary functions occur due to incorrect position and incorrect position is also induced on account of these complaints which may have originated from other causes.

Great care has to be taken in forming the habit of correct pose of sitting.

One should learn to sit straight so that the weight of the body helps to maintain the normal curvature of the spine instead of destroying it. It may appear uncomfortable in the beginning but a few

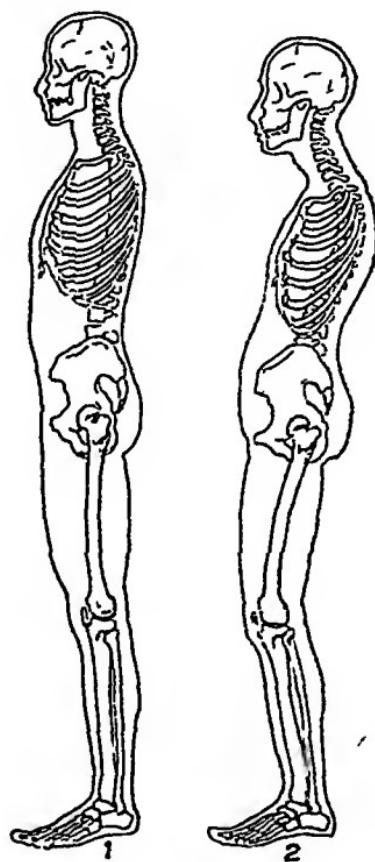


Fig 111

- 1 Correct posture,
- 2 Incorrect posture

CARE OF THE SYSTEMS

days' practice will show that with the body held erect and the spine normally curved, one can sit for the longest period without feeling fatigued. It is well-known that weariness or fatigue is the outcome of the strain on muscles and ligaments. The less the strain, the less the fatigue. There is always some strain on the muscles but the posture of least strain is the correct posture.

When the bones are tender, every precaution should be taken not to put undue pressure on them. Children putting an excessive load on their frame of bones, get quickly deformed.

THE SENSES

Care of the Senses

The sensory organs vary in their receptive capacity. There is a lower limit of energy which must be reached to effect sensation. The sensation then becomes greater, the greater the energy. But again it reaches a higher limit beyond which increase of energy does not produce increased sensation. For example, faintest light cannot be perceived when it is beyond a certain limit but with increased light an object becomes more and more visible. But if the brilliancy of light is progressively increased, then after a period it cannot produce increased sensation. On the contrary, by exposure to extreme energy the sensory organ gets fatigued and exhausted. A very loud sound is followed by a period of deafness, a very brilliant light fatigues the eyes and nothing may be visible for a short time after such an exposure.

Again the perceptive capacity of the sensory organ is a relative one. In a moon-lit night the fainter stars are not visible which are only visible in the dark night. Again in the day time no stars are visible although both the faint and the brilliant stars are shining all the time. The relative presence of more and more light makes the fainter lights less and less visible.

CARE OF THE SYSTEMS

If a tola is put on our hand the weight is perceptible but if there is a 40 tola weight on our hand then the addition or withdrawal of a tola will not be perceptible. By keeping in mind this principle, we may protect our sensory organs from extremes of exposure.

Sensations are received from outside as well as from inside. Sensations are continually arising in all parts of our body by which we become aware of the position of our body and limbs and also about their movements. But the working of the internal organs in their normal state does not create sensation. Thus, we do not perceive that we are digesting or the liver, the spleen or the kidneys are working or that here is a bone and there is a tooth, unless something abnormal happens with them. We are unaware of the existence of the bladder till it is distended with urine. When there is a demand for urination, it imperceptibly diverts our consciousness. But though we are unconscious of the sensations arising from the internal organs, yet their sum total is an indefinite sensation of comfort or well-being. If it is disturbed we feel uncomfortable. When those nervous impulses producing discomfort become more prominent, they help us to call our attention to the region from which they are arising.

The nervous impulses producing sensation are carried to the sensory organs concerned and are then felt as such. The nervous sensations are different but the character of impulses is same. If the olfactory

NERVOUS IMPULSES CREATE SENSATION

nerves are stimulated we get smell, if the retina is stimulated, we see the exciting objects Even if the retina is irritated by a blow on closed eyelids we see "stars" when there is nothing like them in front of the eyes Even when a limb such as a finger is gone, a stimulus on the nerves on the stump previously connected with the finger, will cause a sensation of pain of the finger which does not exist

Again from some intrinsic cause, the brain may be stimulated and thereby record sensations which are not recorded by any external impulse. Then delirium or hallucinations result The individual thinks that he hears sounds or sees objects which are not existent

Sense of Touch : The Skin

The skin is the organ for sensations of temperature, touch and pressure The skin has got distinct spots of sensation distributed all over it. There are 20,000 spots for reception of sensation of cold and 30,000 spots for reception of sensation of heat Then there are half a million spots for registering touch and pressure

Sensations of pain arise also from points on the skin When the perception of pain in an area is lost, the affected area is said to be anæsthetic A portion of the skin may be anæsthetised by injection of some drugs such as cocaine and novocaine or benumbed

CARE OF THE SYSTEMS

by a counter sensation of extreme cold. Surgical operation may then be performed on the spot under this local anaesthesia.

The skin may be hyper-sensitive on account of certain diseases and there may be perversion of sensation under certain other conditions when one may feel as worms are creeping. Itching is a sensation due to irritation of the nerve endings of the skin. Such irritation may be due to bites of insects. When there is such irritation without any apparent causes in the affected portion then it is to be assumed that it is due to the stimulation of nerve endings due to abnormal or toxic substances brought to the skin by blood. Such itching is called pruritus and the causes should be sought for and remedied. Itching or pain gives warning of pricks of thorns or bites of insects or poisonous reptiles and thereby draws attention to the cause.

The sense of touch can be trained to fineness so that one can even read by touch of fine points raised on sheets of paper. Blind men are trained to read by touch like that. If we had not the sense of touch then even if a part of the body were in contact with something burning yet we would not know it. Without this sense of feeling we could not learn to use our hands or fingers and do the numerous things we do.

The skin should be kept clean. Perspiration is continually leaving a solid deposit in thinnest possible layers on the skin. Whether one perspires visibly

SENSITIVENESS OF THE SKIN COLD BATH

or whether invisible perspiration is going on, the deposition of waste solid products is there. This waste deposit should therefore be washed off the skin by bathing. Bath in cold water followed by friction with a towel, not only cleans the skin but also invigorates the body.

Those who are in good health should bathe in order to ward off diseases. It is still more necessary for the sick to bathe daily for the waste matter that accumulates in sickness is more copious than during health and it is also more poisonous. It is a superstition that by bathing one will catch cold. If bathed in a proper way without exposing the body to a draft of air then bathing will help warding off cold rather than induce cold. Each limb should be bathed and wiped dry and covered one after another and then there will be no risk of a sick person catching cold.

Senses of Taste & Smell

Taste, as we generally call it, does not arise entirely in the mouth but it is a combined sensation of taste and smell. When, on catching cold, one blunts the sense of smell, all foods taste flat and lose their flavour. The sense of taste is capable of recognising only a few characteristics of soluble substances placed in the mouth. These are sweet, bitter, acid, pungent, salt etc. Some of the delicate characteristics of food stuff arise from the sense of smell.

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The substances come in contact with the nerve endings on the tongue in a soluble form and give rise to the above different tastes. Substances which are insoluble in water and saliva and also without smell are tasteless.

The organ of smell is placed in a space of about half an inch inside the nose in the upper part of the nasal passage. This place is filled with nerve endings sensitive to smell, to which the substance should be presented in a volatile form. Non-volatile substances have no smell. So minute is the amount of the substance necessary to rouse the sense of smell that a little grain of musk may continue to give off odour for a long time without an appreciable loss of weight. It was difficult at one time to believe that all odorous substances lose weight. But by the help of instruments, more delicate than the balance, it has been demonstrated that these substances do gradually pass into a state of vapour when exposed to the air. It is a peculiar characteristic of the olfactory sense that continual inhalation of a particular odour blunts the sense of that odour.

The nose being the channel for inhalation of air should be clean and free from bacteria. The nose may be occasionally cleaned by drawing up an alkaline antiseptic lotion and throwing that off through the mouth. Certain diseases like influenza are checked by such antiseptic wash of the nose in early stage. The effect of such wash in cold is also very remarkable.

INFLAMMATION OF MIDDLE EAR BOXING ON EAR

Sense of Hearing

Ear, the organ of hearing is a more delicate organ than it is generally supposed to be. It is, therefore, placed in the cavity of the temple bone to protect it from injuries.

As we already know, the outer ear is the tube leading to the middle ear. The middle ear contains the hammer, anvil and stirrup. It communicates with the outer air by the eustachian tube through the throat. This tube is closed during quiet breathing but it is opened during swallowing. When on account of cold or otherwise, the eustachian tube becomes clogged and the pressure of air inside becomes greater than the pressure outside, hearing is seriously affected and may cause inflammation to travel up the eustachian tube and cause infection of the middle ear, which may become filled with pus. Pus accumulating there finds no outlet and may necessitate the puncture of the drum of the ear for its removal. If no operation is undertaken the pressure of pus may cause rupture of the drum. Inflammation of the middle ear is, therefore, a serious thing and should be carefully attended to.

Boxing or a slap on the ear also may cause rupture of the tympanum and consequent deafness. The ear should, therefore, not be used as a place of administering physical punishment.

The canal of the outer ear secretes a sort of yellow bitter wax which along with the hairs grown on the canal, discourages insects getting inside the ear.

CARE OF THE SYSTEMS

Should however insects get in, the best way to get rid of them is to drown them by pouring in water or oil at body temperature. Care should be taken that the water is almost tepid and not of higher temperature. It should not be cold either.

Sight : The Eyes

The eyes are so delicate organs and so extremely useful that every care should be given to the hygiene of the eyes. Lips and face should be washed two or three times a day. The eyes may get inflamed by abrasions, excessive exposure to light or dust or from bacterial diseases. Once the eyes get inflamed, pus generally forms in the corners of eyes. This then becomes a source of spreading contagion to others. Flies may sit on such a foul eye and carry infection. Dried crust may be blown by the wind or common articles of use contaminated by such pus, may carry the infection. Beds, towels and pillows, once used by infected persons help to spread the disease to the subsequent users. It is, therefore, that the eye disease comes more often as an epidemic.

The habit of putting fingers in the eyes for picking up any foreign object is fraught with grave danger. We handle numerous contaminated things. Even when we board a bus or enter a carriage we have to catch the handle or push the knob or hold the railing. All these things may have been used by others and got contaminated with pus from their fingers, hands etc.

INJUDICIOUS USE OF LIGHT SHORT-SIGHTEDNESS

Persons innocently catch such handles, knobs and railings and then if there is any irritation in the eyes from any causes, the same fingers or palms are used for rubbing the eyes. Contamination is then almost sure to follow. Bacterial infections are more dangerous and all new born babies should be kept out of touch of persons suffering from the eye disease who are likely to act as carriers. Corners of any cloth or towel should not be used for removing dirt etc.

Injudicious use of light does harm to the eyes and brings in short-sightedness—a disease of school-going children and youths. Exhaustion of the eyes by reading is also a fruitful cause. The most common symptom of any form of the eye disease due to short sight, long sight or other disease due to abnormality of the cornea, is headache. Such headache can only be cured by fitting proper spectacles. In such cases spectacles not only give the relief immediately needed but also stop further damage to the eyes. While reading or writing light should be allowed to fall on the object preferably from behind over the shoulders. The eyes should be protected from smoke. Smoke irritates the eyes and sooner or later is bound to injure the eyes. Delicate though the organ is, it can withstand a lot of wrong use for a very long period. But then, sometimes nature asserts itself. It is then that the injury may be discovered and then it may be too late for cure.

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THE REPRODUCTIVE SYSTEM

Care of Reproductive System

The male testes contain semen with sperms which is conveyed by a tube to the entrance of the urethra from which it is ejected out. The female ovaries contain ova or eggs. These are carried by the fallopian tubes to the uterus. The male sperms are minute things shaped like tadpoles and can make their way in fluid or mucus mass with the help of the tails. The sperm seeks its way up with the object of meeting an ovum. If they chance to meet, then the two combine. The sperm enters the ovum and then sheds its tail, for there is no more necessity of travelling up. If the meeting takes place in the tube placed above the uterus then the fertilised ovum rolls down and drops into the uterus and makes an attachment to the wall of the uterus. There the fertilised ovum transforms itself into embryo and with further development it is called a foetus. After about 280 days the foetus is delivered out as a new born child. The sperm and the ovum are the two half seeds which join together to bring forth a new living thing.

The legitimate use of the organs of generation is for the sole purpose of getting a child as and when the parents deem necessary and judicious. But

LUSTFULNESS BRAHMACHARYA

human beings have been perverting the use of these organs with considerable injury to themselves

We have seen in the chapter of glands that the testes and ovaries secrete substances which give manliness to men and womanliness to women. If the vital fluid is used for its legitimate purpose, there can be occasion for its use only once in several years for getting a child. But if the male organ is used oftner and the fluid wasted, then man loses manliness. That is why restraint of this organ is held to be the first necessity for attainment of *Brahmacharya*.

Lust is the prime exciter of this organ. Lust has to be avoided. How it is to be done comes more within the scope of a book on methods of leading a pure life. But it is no less a necessary subject on any book on health, for a lustful person cannot enjoy health. One has to shed lust in order to live a healthy life. It is one of the most difficult things, any day. Men of character in all ages have been striving to show us the way, at the same time have been acknowledging the powerful nature of the attraction of lust.

Tulsidasji says, "Who is there whom passions have not made blind? Who is there on earth whom lust has not made its plaything? Who is there who was not boiled about by the fire of youth and who again is there whose fame has not been sullied by selfishness?"

This all-powerful passion makes plaything of flesh and even the strongest of us shake before it. Submission to this passion for the moment makes

CARE OF THE SYSTEMS

brutes of men. Indeed men have proved themselves to be more brutal in this respect than some of the lower animals. In the control of this instinct lies manhood. If it is regarded as a disease, it must be a natural disease and the remedy is provided in the natural healthful way of living physically and mentally. As regards the play of this passion, physical and mental factors play equally powerful. A disgust for indulging in this passion may be brought about by force of will and of clean habit. When the mind is not formed, physical factors begin to react even there. Childrens' genital organs may get irritated by dirt and filth accumulated about them and a sense of relief from friction by rubbing may lead to very vicious habits. Sometimes children learn improper behaviour from playmates. It is necessary for the elders to take precaution that children do not acquire this filthy habit. Those who have attained the age to understand the harmful nature of indulging in erotic practices, can easily see that the throwing off of the vital fluid is more dangerous than the cutting off of an artery and the throwing away of some blood. If there was a proposal to cut one's artery and let ounces of blood to flow off, then naturally one would be struck with dismay. But throwing off of the vital fluid means certainly nothing less but much more. Great injury is done to the body by the frequency of such waste and life is cut short, the body is wasted and becomes non-restraint to disease germs and is otherwise crippled. Venereal diseases that follow a

WASTE OF VITALITY CONTROL OF ORGAN

moral fall in this direction are very painful, difficult to cure and bring immense misery and shame to their victims This knowledge also should serve as a restrainer

Purity of associates and a good moral atmosphere contribute greatly towards checking wrong sex instinct Marriage gives protection and is a restraint, but married men also go to excess

Practical Directions — Those who have involuntary nocturnal emissions will do well to observe the general rules of health Taking light food, going to bed at least three hours after taking the last meal, cleanliness of body, proper exercise and cold bath are all necessary adjuncts A pad of mud poultice placed on the organ while going to sleep has been found to be a successful cure against involuntary emission Greatest of all is the attitude of mind If evil thoughts are banished from the mind then even the unobserved causes of excitement leading to such emissions may disappear Wearing of a *langote* so that the organ finds no scope to get erect, is useful

Rich and spicy food excites the senses and should be avoided by those who aspire to keep themselves clean in this respect So much about involuntary wastes But when one knowingly wastes oneself, by sheer force of habit, it becomes a very difficult matter for control Will force has to be developed But in doing so care should be taken also to avoid temptation and snares When even spices are to be avoided, what can be said of intoxicants

CARE OF THE SYSTEMS

The reading of books, the seeing of scenes and hearing of stories which excite animal passions, should be carefully avoided. There should be daily and full evacuation of bowels and the bladder should not be allowed to press on the organs by suppression of calls of nature. Nerves should be kept soothed by baths. The toxins should not be allowed to be accumulated by over-eating or irregular eating. Imperfect working of the lungs and of the skin as also of the kidneys and the intestines, helps to accumulate poisons within the body and these poisons often affect the system by stimulating the nerves which control the sexual organs. A cold bath is a great soother to the whole system and should be taken as often as possible by those who find it difficult to keep sexual passion under control. Absorption in pure and useful work helps to keep the mind clean of unworthy thoughts. Therefore, the aspirant after continence should never keep his mind vacant or the limbs idle but shall strive to occupy the mind with noble and elevating thoughts and also keep the body engaged in noble and engrossing pursuits. Above all, God's grace should be invoked to aid the failing flesh, as all our efforts may be after all of no avail.

There is a growing tendency to indulge in sexual intercourse and avoid its consequences by adopting contraceptive appliances. These are devices which tempt men and women to transgress and avoid the consequences of such transgression. Birth control appliances may successfully prevent conception but it

SEXUAL VICES CONTRACEPTIVES

cannot prevent the consequences of flouting nature. If these are widely used, the race or community using them will very soon find that it is getting depraved, dehumanised, brutalised and on the high road to extinction. These appliances invite unbridled exercise of passions and the curse of nature is bound to follow, sure enough.

As regards women, mothers should teach daughters to keep the parts clean and free from irritation due to accumulation of dirt and secretion. The future mothers of nation should know that the very basis of their character as daughter and sister, as wife and mother is undermined by tolerance of any form of sexual offences. They should know that they will ruin themselves and their race if they take sexual offences lightly. They are by nature capable of great restraint and they should increase their restraint manyfold when the craze is for self-centred, short-sighted enjoyment.

CHAPTER III

NUTRITION

HEALTH & DISEASE

We call disease by various names. Names are necessary in order to convey exactly what or where the mischief is. But essentially all diseases are one. As the word connotes, disease is want of ease. When all the organs are performing their functions so well and naturally that we are almost unconscious about their existence, when there is a feeling of ease or comfort about oneself in work and rest, we are said to be healthy. When this sense of comfort disappears for some reason or another, we say, we have got disease. The source of disease may be the mind or the body or an accident but all the same there is some irregularity somewhere which should account for the absence of ease or disease.

Going deeper, we may say what is the reason of this absence of ease. Apart from accidents there is only one reason for absence of ease ; it is the toxic condition of the body. What again is the toxic condition ? If it be true that the human body is kept bathed in an ever-flowing stream of living blood, if it be true that the body with its muscles and nerves, bones, hairs, skin and nails is made out of blood and

DISEASE TOXIC CONDITION OF BLOOD

kept repaired by blood then it is also true that disease or the toxic condition of the body is due to impurities or abnormalities in blood. If the blood is hundred per cent pure then no toxin can accumulate in the body and there can be no disease. There are several ways by which blood can become abnormal. Proper exercise, proper diet, proper use of air and water and proper mental condition ensure purity of blood and maintenance of the system. What disturbs this health-giving quality of blood brings in disease. Disease, therefore, is the want of ease in the body owing to abnormal condition of blood. Poisons or toxins are being continually produced by the life-process itself. Whatever food we eat and air we breathe ultimately serve to create and rejuvenate blood. While some of the food goes to form blood, a portion which is not converted into blood is thrown out as excreta. The body itself is burning and the products of combustion are poisonous substances. These are thrown out of the body by the lungs and the skin, by the kidneys and colons. In the process of intake we may take such materials as are not exactly fit for making pure blood. The blood then, deteriorates and we get toxic or poisonous conditions. The toxic condition of blood does not necessarily mean that some thing very fatal is going to happen immediately. No, the toxic condition may continue for months. Deficiency or excess of some components in blood may continue for months and still may not produce any visible effect upon the body.

NUTRITION

Similarly, the toxic condition may be given rise to by imperfect exercise. Some materials meant for combustion by exercise are normally put into blood stream by the stomach. Due to want of or insufficient exercise these substances overload the blood. Blood attempts to get rid of these by depositing them here and there. The foreign matter so deposited disturbs the easy working of the organs and we get disease which we name variously according to the part affected.

Again if the blood in the body is so disturbed that nerve centres that regulate the temperature are affected, we then have perhaps high temperature. The Condition that leads to high temperature is known as fever. It is an attempt by the body to throw out the toxins which create high temperature and disturbance connected with it.

The lungs are the doors through which poison from the blood is eliminated and the soiled blood is purified by intake of fresh air. If the fresh air intake is tampered with or if the exhalation is not complete, then in either case the blood will remain in toxic condition leading to disease which may appear in various parts of the body under various names.

Similarly, if we put the skin to undue exposure, or if we shut it up too much from access of air or light, then it fails to drain the harmful excretal or waste matter which in such case is reabsorbed by the blood. If the health-giving sunlight will not act on the skin, the toxic condition of blood will arise. A score of diseases follows this state and we call them by a

TOXINS OF BLOOD ELIMINATION

score of names But the initial fact remains that disease has been caused by toxic condition of blood due to this or that

The colon or the large intestine disposes of the waste food materials by converting them into faeces and throwing them out through the rectum. Now, if out of a sense of false modesty, we do not timely respond to the call for evacuation or if we do not take sufficient quantity of water to give faeces the fluidity necessary for easy and timely passage through the colon, the result would be that the waste products from the sewer will stay longer in the colon than is safe, and the blood will then reabsorb poisonous materials through the absorbing walls of the colon. Blood becomes loaded with harmful materials which react on the system giving rise to diseases like gout, rheumatism, headache, nausea etc. Then again blood is apt to be contaminated or poisoned by outside agents. Microbes and bacteria enter into the body through the skin and the mucous membranes and thence to blood. These bacteria and microbes attack vulnerable points and lodge themselves there, try to multiply using the body as their host and poison the blood.

Parasites are injected into the body by mosquitoes and flies. They multiply and pollute the blood, giving rise to various diseases. It is the blood that is poisoned or is used as a carrier of poison.

Ordinarily the body possesses sufficient antitoxin to counteract the toxic state of blood. But if the

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blood be heavily poisoned or if the poison be allowed to remain long in the blood, then its resisting power is overcome. Disease is the consequence. It is not claimed that a pure-blooded body is proof against all attacks of bacteria, parasites or poisons. However pure the blood of a person may be, it may not be able to resist the effects of snake venom if the body is sufficiently dosed with it. It is seen that typhoid, tuberculosis or colon bacilli are found in the system of men enjoying immunity from their attacks. In these cases the body or the host does not permit multiplication of these bacilli. It consequently follows that in these cases blood is too pure to be tampered with by tubercle bacilli etc. in the form and under the condition they get in.

It is now a well known fact that if a toxin is introduced into the blood, the body at once strives to counteract its effect by creating an antitoxin in it. Upon this scientific knowledge is based serum therapy.

If diphtheria bacilli get entrance in the blood immediately an antitoxin is created in the blood to resist its action. If the antitoxin produced is not sufficiently powerful, then the bacilli continue to multiply injuring and ultimately killing the host. In order, therefore, to strengthen blood to fight the toxins, an artificial aid is taken.

If diphtheria bacilli are injected into a living horse in minute dose, the horse produces antitoxin in its blood to fight the toxin. The horse then can again be injected with another dose of virulence, which

TOXINS AND ANTITOXINS

will produce more powerful antitoxin in its blood. This process may be repeated for sometimes till the horse's blood is full of diphtheria antitoxin. If the blood is taken out and its serum or the white fluid portion is separated, it is then found to contain the diphtheria antitoxin. This serum when injected into the blood of a diphtheria patient, at once increases his resisting power enabling him to overcome the toxic effects and live through the stage of attack.

These cases clearly show that it is the toxic condition of the blood that creates diseases by whatever name we may call them. It can, therefore, be said that there is only one disease e.g., the toxic condition of blood which produces different symptoms according to the organ affected or according to the nature of toxin. Having made it abundantly clear that there is only one disease, namely the toxin of blood we may now turn our attention to the method of curing disease. If there is one disease and we have seen that it is so, then we may reasonably conclude that there is therefore one method for its cure and that method is the purification of the blood and so of the system of the toxins.

In the process of maintaining the body, toxins are being produced. Health consists in the ability of the body to eliminate the toxins. Proper maintenance of the body depends a great deal upon what we eat, how we eat and when we eat. Then there is the need of exercise for proper absorption of food, elimination of the toxins and refuse matter. Mental state is a

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decisive factor also Health consists in proper balancing of these processes. There is no absolute standard for any of the processes ; one is dependent upon the other for the balanced working. We shall, therefore, know optimum conditions for each of these processes, so that we may balance them and enjoy health. When the balance is disturbed, toxins accumulate in blood, giving rise to disease. In order to maintain good health, we shall have an adequate supply of pure blood containing all the nourishing materials.

The question naturally arises as to how to maintain an adequate supply of blood of proper composition For this we have to enter into the details of Nutrition. In the following pages we shall try to find out how we can regulate our food and mode of living, so that we may keep the blood pure and enjoy health and if diseased, find a speedy way to recovery.

In speaking of diseases we have confined ourselves to such diseases as are brought about by contamination of toxins A fracture caused by a blow may induce a disease of the bones. Evidently such causes of disease are outside us. But even in such cases purity of blood goes a great way towards healing the injury wherever possible.

EATING AND NUTRITION

Without food we cannot live. But we eat more than we need. We crave for more than we can consume with safety. Besides, we are not content with the right sort of food merely, but season them with spices which do injury to the stomach. Oftener than not, we eat just to satisfy our taste without any regard to the consideration of health. With the result that we burden our system with food which acts as poison. The consequence is endless trouble.

What do we not do to earn our food? And the use that we make of the food, makes us objects of pity. The earning of bread occupies so much of the energy of men. Preparation of food takes much more of the time and energy of women who exhaust their skill in presenting it in as different varieties and palatable dishes as possible. Because we eat to satisfy taste, we make blunders which nature does not forgive. Savants say that more people die of over-feeding than of under-feeding. But the lesson is lost upon us and we do eat for pleasure. We glut ourselves and would have others we love or respect to glut themselves. We press them to eat some extra sweets, even after a square meal. Mothers indulge in this unhealthy practice in respect of their children.

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'Eat and enjoy' is the formula written large in our households. If we had eaten for health, our necessity to earn should have been less, and we would have enjoyed life more and would have maintained health better.

Our festive occasions are occasions of unrestrained indulgence of the organ of taste. In the Sradh ceremony, in X'Mas, in Id, or in the Puja, friends are invited to indulge in the use of the organ of taste. We do not see through the crudeness of such practices. One should eat only when one is hungry. It is a physical necessity. Physical call must be satisfied for the purpose of health. But why should we invite people to respond to such a call in other's house? If eating is regarded as a physical act as evacuation of bowels or cleaning the teeth is, why should we then invite people to have the pleasure of taking food in our houses when we do not invite them to our houses to answer the call of nature? With robust simplicity Gandhiji asks, why should not people offer a tooth stick to a guest to cleanse his teeth with as much propriety as they offer tiffin, for they are equal physical necessities.

But people have not learnt to take a sane view of eating. Owing to the undue importance we give to eating, a few well-placed people eat more than they require, and a lot of others go hungry. Nature in her economy has provided for enough food for all of us. If some take more, naturally others will have so much less to eat. Because people do not realise

FOOD AND FUEL

this, there is so much misery. This ethical consideration also ought to weigh with us in readjusting our views about eating. We should eat to supply nutrition to the body and not to satisfy taste. We shall now come to the consideration of what food we should take if we are to eat for nutrition.

Proper nutrition for all-round well-being of man should be interpreted as meaning (1) uninterrupted attainment to the full adult size, (2) ability to resist infection and capacity to reach an old age without senility and of discharging properly the functions of the body. These cannot be attained without a careful adjustment of the food for the various needs of the body. The human system may be given cereals and legumes, tubers, roots and fruits, fish and meat and still a combination of all these may not give satisfactory results.

We should get an insight into the nature of the needs of the body and then see what kinds of food are likely to satisfy its needs.

A man continuously works whether he sleeps or sits still, for he goes on breathing and this means work. When work is performed, some energy is spent. The body supplies this energy by combustion of blood which is recouped from food materials. When we burn oil in a lamp we may say how much of heat and how much of carbon dioxide have been produced. By measuring the amount of heat and carbon dioxide we may find out

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how much oil they correspond to. The lamp burns oil as fuel and gives light as heat and energy. Similarly, the human body burns food as fuel and gives energy in the form of heat and motions and also produces carbon dioxide out of the combustion. In a lamp or in an engine we burn oil or petrol; the fuel we burn in human engine we call food. From the amount of carbon dioxide breathed out we can determine accurately the quantity of carbon or fuel burnt or consumed by the body.

Engines according to their construction require different kinds of fuel, coal, oil or petrol. All these fuels contain carbon that burns to supply energy. In the human engine carbohydrates, fats etc. provide this carbon.

Carbohydrate is a general term which includes substances like starch, rice, arrowroot, barley, wheat and sugar. Energy required by men can be had of any of these fuels. Sugar is a concentrated and readily combustible form of carbohydrate for the human engine. Sugar therefore can immediately meet the requirement of the exhausted body. Other carbohydrate foods require longer time to be converted into sugar or similar products for the engine to burn. Foods have to go through the processes of digestion and assimilation. We feed the boiler of a steam engine with coal. The coal produces steam and this steam gives the energy. Similarly in the human engine the food or fuel we take, is converted into blood which burns to give energy. As the exhaust

HUMAN ENGINE REPAIRS AND MAINTENANCE

pipe of the engine throws out carbon dioxide or exhaust steam, so the human engine ejects the carbon dioxide by exhalation. Therefore, carbohydrates, fats etc are fuels exactly in the same sense as coal or petrol is

There is however one point of difference. We get a mechanical engine ready-made from the workshop. The workshop brings in brass, iron, copper, aluminium, wood, rubber, leather and many other things and assembling them builds the engine and the body of the car. After the engine is built and set up on its body or base then it can consume fuel and give work. But the human engine has to build its own body and to give power out of it.

With human engine, therefore, it is not merely a question of giving power by consumption of fuel but also of building the body of the engine and maintaining it in repair. Blood being the only medium through which this is done, it has to be kept with an uninterrupted supply of building materials other than carbohydrates or fuel.

In order to minimise the wear and tear, the mechanical engines are kept lubricated. But mere lubrication is not enough. Replacement of parts is also a condition for proper service in as much as parts wear out even though carefully lubricated. The human body which is a most perfect engine, is always maintained in repair. There is a daily wear of the body on account of the work we get out of it and the loss is daily made up. But the parallel ceases

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there. The human body is an engine which does not wear away the more it is worked. Its wear is a constant factor. Whether the body works or not, the mere fact of living occasions waste or involves idle running of the engine. It is just what happens an engine when it is made to run without any work being taken out of it.

The materials that build the human body and keep it in repair are some things more than the carbohydrates. Carbohydrate is a fuel as well as a building material. Scientists have found that the body is built out of carbohydrates to which must be added also mineral salts and a substance called protein. Besides protein, bones and flesh, muscles and nerves, on analysis are found to contain various mineral substances and salts. These have to be daily added to blood through the medium of food. We have three principal nutrients necessary for the building of body, its maintenance and for obtaining work out of it. These are proteins, carbohydrates and mineral salts.

Water of course is necessary. Three-fourths of the weight of human body comes from water. Water from the body escapes by direct evaporation through the skin and as a product of combustion. Therefore, a considerable quantity of water is daily necessary to meet the requirements of the body. But the list is not yet complete although it is apparently so.

Scientists have found that even though the requisite quantity of pure carbohydrates, pure proteins,

BODY BUILDING—GROWTH VITAMINS

pure mineral salts and pure water are taken daily, still the system fails to perform its functions : growth is arrested, infection sets in and loss of weight follows leading ultimately to death

At one time scientists thought that they had found out accurately the substances needed for growth, maintenance and working of the body but they had to admit later on that they had yet to know something more After repeated and long continued researches they came to the conclusion that in addition to the building, maintaining and working materials, some other substances in minute quantity were necessary to make the body function properly Scientists have not upto now been able to determine exactly what these substances are but they have known many of their properties and have been able to ascertain their character and sources These substances they have named vitamins or life-giving substances They upto now, have determined the nature and character of six such and have found that if the human system is deprived of any one of them, organs fail to function properly and give rise to serious complications

Feeding experiments could not long be continued on men for obvious reason Biologists then took to experimenting on rats One day in rat's life is equal to thirty days in man's life Rats reproduce in three months Therefore, in course of a year the fourth generation can be reared and the effect of any food on its posterity up to the fourth generation can be observed in the course of a year The use of rats opened

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a new chapter on biological examinations of food and since 1900, newer knowledge has gone on accumulating. It was found in that year that egg-yolk fats and butter fats had the same effect on growth but lard did not stimulate growth. From this it was discovered that there is an oil soluble substance in milk and egg fats which is absent in lard or almond oil although chemically all these are fats. Rats fed on pure substances to which was added 2 c. c. of milk daily grew but when milk was replaced by lard they did not grow. This fat soluble substance has been called vitamin. Its presence can be traced in many things and it has been ascertained that the absence of this substance arrests the growth of animals. After this, one vitamin after another was discovered and the foods containing them were found out. Leaving aside the story of vitamins, we shall take up the general foundation of nutrition on proteins, carbohydrates, minerals, vitamins and water and casually try to understand what part these play in building of the body and its maintenance. Besides these ingredients, fat is another material necessary for the system. But fortunately for us we can make fat within the system from carbohydrates. It is not surprising that the living system can make many things out of materials, which cannot be reproduced in the laboratory. Cattle subsist on grass only and from that build up flesh, bones and fat. Men cannot do that and assimilate grass. We can do that out of some cereals, legumes and leaves which is no less wonderful.

NEWER KNOWLEDGE OF NUTRITION

The animal system draws nutrition from food materials. The food materials undergo chemical changes within the body under the influence of life or living cells. By these changes the cereals and legumes that we eat along with our air and water intake are converted into different body materials. These changes are called metabolism. These changes we may roughly classify into three grades. Some of these changes are concerned with the (1) construction or building up of body material, some are concerned with the (2) maintenance or repair of the tissues in the life-process and some other are concerned with the supply of the energy-yielding material for the internal and (4) external activities of the system. If we eliminate items 1, 2 and 4, that is, if we stop building and maintenance or repair and cease all external activities, then only one factor viz., energy supplied for internal activities remains. The energy requirement of a man for carrying on internal work is called his basal or minimum metabolism. We may have an introduction to the ideas of nutrition requirements by studying metabolism of starvation.

Metabolism of Starvation

A starving animal first draws on its store of carbohydrates which are stored in the form of glycogen in the liver and tissues. After the carbohydrates, fat is drawn upon. Even though a person has got a great reserve of fat yet the burning

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of fat or glycogen only will not meet the requirement of the body. Some protein must also burn to enable the life-process to go on.

So along with fat, some protein also continues to be burnt. The more the supply of fat is exhausted, the more the body protein is drawn upon. And after fat is wholly exhausted, he lives entirely on proteins. This means, he consumes his muscles, bones and skin. The drawing upon the organs caused by starvation takes place on a definite principle. The unimportant organs are consumed first, the more important organs coming next and the most important ones coming last; and when the vital organs are drawn upon, death results.

Take for example, the case of bones. All the bones do not fare similarly under starvation. The long bones of foot for example, maintain their integrity better than the bones of skull or the fingers. Starvation works in a wonderful way. The skin, the bones, the liver and spleen and other organs get dissolved slowly in order to supply fuel to the body.

It is clear, therefore, that man must supply food to the system for maintenance of life and if food is not supplied from outside, he will utilise his own tissues as food.

The metabolism during starvation is remarkably constant as also the amount of fat and protein consumed during the time. Hence it is that when a well-nourished person starves himself, he consumes a definite portion of protein as compared with the

DEATH FROM STARVATION CALORIES

amount of starch consumed It is generally found that 13 per cent of energy is derived from protein and 87 per cent from fat or glycogen (from carbohydrate) It has been found and corroborated that fat is a much more economical food for fuel than proteins

It is not true that death from starvation is due to the failure of cells to receive nourishment, for enough substance to maintain life for some days more still is left on the starved body at the time of death The explanation is that the break-down occurs due to the loss of some substance from the most important organs

Basal Metabolism and Components of Food

Next to metabolism of starvation, comes the basal metabolism or the changes that occur when an animal is not working but is completely at rest as during sleep. To know the basal metabolism is to know the quantity of fuel that can keep the engine running Above that the more work is taken out of the body, proportionately more fuel is burnt This basal metabolism has been found out in case of man It is expressed in calories or number of heat units given out by the body From the amount of carbon dioxide we exhale as has been shown above, we can accurately find out the quantity of carbon burnt within the body or the amount of metabolism accomplished. In a full-grown man of average height

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it has been found to be one calorie per kilogram (2.2 lbs) of body weight per hour. A calorie is the amount of heat required for raising 1 kilogram of water through 1 centigrade. It is also called a big calorie. For example, if a man weighs 154 lbs or 70 kilograms, his basal metabolism in 24 hours will be 70×24 or 1680 calories.

The basal metabolism really depends upon the surface extent of the body. The greater the body surface of man is, the more is his metabolism. A thin man has less metabolism than a stout man. But the surface is somehow proportionate to height and weight. For rough calculation, one calorie per kilogram per hour instead of the body surface calculation is a short and workable means.

According to the above formula we may see that for an average man 1300 calories are necessary to keep the human engine going when no work is taken out of it. Extra calories are required proportionately to the amount of work taken out.

The following indicates the extra calories required per hour by men in different vocations. Tailor 44, Bookbinder 81, Shoemaker 90, Metalwork filing 141, Furniture-painter 145, Carpenter 146, Wood sawing 378.

From this chart we can roughly work out calories required by individuals. For example, a carpenter who has to work eight hours continuously, with his tools, will require for his work 146×8 or 1168 calories. If the man weighs 154 lbs, his basal

CALORIES REQUIRED FOR WORK

metabolism will require 1680 calories Therefore, his total requirement will be 2848 calories

Having found out the calories necessary for maintenance, we have to find out suitable ingredients which a man must burn in his system to obtain the required calories

If instead of a human system, we had a fire place or a stove, we could exactly say so many ounces of coal or petroleum will be required to produce the heat But we must choose our fuel according to the nature of our machine The human machine can burn only what it can eat, digest and transform into blood But then it does not end there The human system can digest and burn, for example, carbohydrates But if we put carbohydrates only into the stomach it will not serve our purpose We cannot live long on carbohydrates As we have said carbohydrate can give us energy for work, but we have to build and maintain muscles Therefore, we must have in the fuel all the materials that are in the human system We come back to the position that we must have the following components in the food we take proteins, carbohydrates and fats, mineral salts, vitamins, water and air, for the complete operation of prolonged existence The sum total of such substances eaten must also give the requisite number of calories, in the above case 2848 calories These calories are intended not only to provide working energy but to maintain the body and keep it in repair

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The body on analysis is found to consist of the following :

Parts	Percentage of weight, well-nourished animals
Skeleton	14 78
Skin	10 30
Muscles	53.77
Brain & Cord	0 94
Eyes	0 11
Heart	0 54
Blood	7 14
Spleen	0 39
Liver	3.98
Pancreas	0 33
Kidneys	0 66
Genitals	0 30
Stomach & Intestines	5 81
Lungs	0 89
	100 00

PROTEIN

What is protein ? Milk casein is a protein When fat is taken out of milk and the remaining liquid is precipitated with acid, the precipitated solid contains casein The clear liquid left over contains sugar of milk Casein, fat and sugar are the chief constituents of milk which may very roughly be said to be present in proportion of 3, 4 and 5 per cent respectively Milk casein is an ideal protein food Cereals, legumes and meat contain protein.

If wheat flour be made into a dough with water and then the dough is gradually washed out, the starch granules get away with water leaving a sticky substance called gluten This is the protein of the wheat Similarly there is protein in rice 11 per cent of the weight of wheat, 8 per cent of rice and nearly 25 per cent of peas, lentils and other dals are proteins Meat contains nearly 20 per cent of protein Protein is required for growth and for maintenance Maintenance portion being a definite quantity, depends on the weight of the body. Protein is not required in proportion to the work we do Protein is the muscle material Working the muscles more, does not involve proportionate waste of them requiring proportionately more for their maintenance Repeated experiments have proved that protein

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requirement is not dependent on the amount of work done. The more work we do the more fuel is necessary, just as an engine turning out more work burns more petrol, coal or oil. The minimum protein requirement has been variously determined Experimental results obtained from the examination of excreta of a fasting man for protein products and proteins may guide us The following is the result of a case of fasting man throwing out proteins in excreta :

1—5th day	80.4	gram protein per day
6—10th ,,	53.1	"
11—15th ,,	36.2	"
16—20th ,,	33.1	"
21—25th ,,	29.3	"
26—30th ,,	33.3	"

From these and other recorded cases, it has been generally concluded that the minimum protein requirement for an adult is 30 grams or a little over an ounce a day. While the above result has been obtained from cases of fasting men, another sort of data has been obtained by keeping batches of men on minimum protein limit for months. Chittenden conceived that a low protein diet in suitable variety, meets best the nutritive requirements of the body. He stressed the point that protein taken in excess of what is necessary cannot be stored. It has to be broken up in the system into urea containing the nitrogen and other simple components

CHITTENDEN ON LOW PROTEIN REQUIREMENT

The urea is excreted through the urine and the products of the break-up then burn to give energy. Excess protein creates unnecessary heat in its process of being broken up into combustible product and it taxes the kidneys which have to drain away all the unnecessary nitrogen, the chief and valuable component of protein, which gives it its distinctive character. Protein for growth or repair is retained in the body. Waste protein is broken up and excreted in the form of urea. The broken-up protein is not excreted with faeces but the whole of it has to be drained away by filtration of blood through the kidneys.

Chittenden emphasised the necessity of relieving the organs of this unnecessary task. He pointed out that if protein is taken in quantities more than what is needed for the daily repair or growth, then the excess produces putrefactive decomposition in the intestines which results in the absorption of products which are "Physiological abominations". The logical deduction is that protein intake should be reduced to as low a level as possible to keep the body in protein equilibrium.

In order to demonstrate whether such a regimen was safe for adults, Chittenden experimented on himself by taking 40 grams of proteins daily and found that he felt the better for that both physically and mentally. He also experimented on a group of students and on a group of soldiers. The results of these experiments carried on for nine months,

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proved his proposition to be correct. Other experts are however, of opinion that instead of taking the minimum quantity of protein, enough should be taken to get the most satisfactory results. 50—60 grams per day or say 2 ounces per day may be considered to be this optimum.

A man who takes a mixed diet of rice or atta and dal may take enough protein in quantity as under :

Atta or rice-10 or 12 ounces contain 1 ounce of protein
Dal 4 „ „ 1 „ „

So that a person who takes 10 ounces (5 chattacks) of atta and 4 ounces of dal or 12 ounces (6 chattacks) of rice along with 4 ounces (2 chattacks) of dal, takes the optimum quantity of protein.

But when we say that a man requires 2 ounces of protein daily we say really very little. For one may take 2 ounces of protein daily and yet suffer from protein deficiency. The protein should be of the proper quality. Protein is not a simple chemical substance but it is a mixture of various substances all going under the common name of amino acids, but there are others which cannot be made from other acids, but must be supplied as such to meet the requirements. Milk, meat and eggs contain complete proteins whereas maize or corn contains incomplete proteins. The proteins of wheat mixed with the proteins of legumes form complete proteins. Unfortunately the character of proteins of the food materials of Indians have not yet been thoroughly studied or

QUALITY OF PROTEINS OPTIMUM QUANTITY

results published In most cases we have to watch physiological results to be sure of the suitability of a particular protein In order to avoid the risk of taking an incomplete mixture, we may take a quantity of milk which contains complete protein and which will act as a reserve or protector to make up any deficiency of any particular amino acid content of the proteins of the daily food

Protein is a good thing and an essential thing for the growth and maintenance of the body But too much of this good thing will do positive injury More than necessary protein acts as a poison In fact not only protein but all foods taken in excess of requirement, injure and poison the blood This is much more true of proteins We know that for basal metabolism, that is for meeting the requirement of the body during rest as in sleep, only 30 grams of protein are burnt The metabolism of starvation also proves this assertion This, therefore, is the minimum daily quantity of the proper form of proteins necessary But proper protein is a vague thing and it is difficult to fix up what exactly will meet our requirements We may take protein in several forms both from vegetable and animal kingdom The protein of one is unlike the protein of another. In order, therefore, to ensure the proper mixture, it is advisable to take an aggregate double the minimum quantity of protein from as many sources as possible Chittenden is satisfied with 40 grams only but McCollum recommends double the quantity.

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Meat may be good food but too much value is put on it as a dietary substance. Experimentors after experimentors have asserted by scientific demonstration that muscular work is not generated at the expense of muscle substance (muscle, meat or protein). By exercise muscles do not waste away but on the contrary, become larger. Muscular work is done at the expense of carbohydrates and fats. Experimentors have conclusively shown that increased work when accompanied by a sufficient increase in the amount of fats and carbohydrates, does not increase the metabolism of protein. Along with this the evil effects of a diet that contains too much protein has been studied. It has been shown that as proteins cannot be stored away as reserve, the extra protein has to be burnt up. That is why meat-eaters feel warmth after they have taken a quantity of meat with their meal. But the poisoning effects appear none the less and so many diseases claim habitation in the body.

"A striking illustration of the manner in which a diet consisting largely of animal tissues modifies the bacterial flora of the intestine and influences the physical and psychical condition of the animals is given by Herter and Kendall

"They restricted monkeys to a diet of eggs and cats to a diet of meat for one or two weeks and then changed them to a diet of milk and glucose. Previous studies had shown that eggs or meats encourage the growth of putrefactive organisms in the colon whereas

ANIMAL AND VEGETABLE FOODS

milk and glucose stimulate the growth of fermentative and lactic-acid-forming organisms. This is also true of a diet containing largely of carbohydrates. After one or two weeks on the milk and glucose diet, the animals were returned to eggs and meat respectively. These intervals were found sufficiently long to change entirely the character of the bacterial flora of the intestine. As the proteolytic or putrefactive types of bacteria began to be predominant, which occurred promptly after restricting the monkeys to eggs, the animals became sleepy and rested their heads upon their hands in a bowed position. They were stupid and responded slowly to external stimuli. They took their food very deliberately and manifested little interest in the surroundings. Not infrequently after a hearty meal they would spend much time trying to bite the wood-work of the cage. The urine was of small volume and amounted to approximately half that produced from the milk-carbohydrate diet. As the protein-digesting bacteria became established in the intestine, the amount of products of putrefaction in the urine increased markedly.

"When the animals were changed to milk-glucose diet, both the physical and psychical attitudes underwent a great change. They no longer held their heads but assumed an erect posture. They were alert and bright and showed a keen interest in their surroundings. Their appetites became sharp and food was consumed with more avidity. The eyes which were dull and lustreless while on the egg-diet, became

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bright. They no longer chewed the wood-work. The products of putrefaction almost disappeared from the urine.

"Evidence from human experience seems sufficient to warrant the conclusion that similar changes in the diet of man induce a similar modification in the flora of the intestinal tract. One may safely conclude that excessive consumption of meat with but small amount of carbohydrates tends to promote the generation of toxic substances which induce lethargy in both men and animals.

"It appears that the carnivorous peoples resemble the carnivorous animals in their attitude towards physical exertion. When well-fed they are lethargic and idle, or do work that requires little exertion. They bestir themselves only when pressed by hunger. Dr. Grenfel states that the Eskimo is an inferior fisherman and will catch one fish to a white man's ten. This we may attribute, in part at least, to intoxication from poisons of bacterial origin due to putrefaction of protein in the intestine "

McCollum and Simmonds p.446.

The above extensive quotation from an acknowledged nutrition authority shows how an excess of protein injures the system and how meat has been scientifically proved to be an inferior article as food. The authors have sympathetic consideration for meat eating but as scientists, they have had to present a very bad case for meat eating. For they not only say that excess of protein is bad, but have proved also that

MEAT—AN INFERIOR FOOD

meat protein produces such flora (bacteria) in the intestines as creates poisons. Vegetable products do not produce the poison and milk on the contrary, with its protein content produces non-putrefying bacteria. Fish and egg proteins belong to the same category as meat proteins, being of the nature of muscle meat substance.

The prejudice in favour of meat eating is great. But evidence of scientists seems to be arrayed against the use of meat. It has been argued that carnivorous animals thrive on meat. But they do not. It was once a problem to rear lions' cubs in captivity. Later on, the scientists have found out the difference between butcher's meat and whole animal. They have found that the whole animal including the liver, the heart, the pancreas, the kidneys and other organs, the skin etc contain substances which together can maintain life. After this discovery, lions' cubs have been reared in excellent physical condition by giving them entire animals such as rabbit, rats etc as food.

In fact butcher's meat or muscle is the poorest part of the carcass and poor as an article of diet. It can poison the system but cannot maintain life.

Much misconception about the efficiency of meat as food has been dispelled in recent years. In 1925 in the 5th edition of his treatise on "Food and Dietetics" Dr Robert Hutchison while dealing with the comparative merits of meat and vegetable food, puts forward the question, "Shall we eat our protein

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in an animal or vegetable form?" Later researches have given the answer and have assigned to meat an inferior place in dietetics

At one time meat extract and meat tea were considered to be of the highest nutritional value. Incalculable harm has been done to patients by all too over emphasis on them. But it was due to ignorance. The truth about meat extract and beef tea has been tersely expressed by Professor Halliburton thus. "Instead of an ox in tea cup, urine in tea cup would be much nearer the fact for the meat extract consists largely of products on the way to urea which more nearly resembles in constitution the urine than they do the flesh of the ox."

We shall now consider the various sources of protein and various protein contents of food materials from vegetable sources in general use

Protein per cent in food materials

3 to 4% Milk

5 — 7% Green peas, cocoanut

8 — 10% Rice, maize

11 — 15% Atta, wheat, jack fruit seeds

16 — 25% Ground nut, dals, dry beans, soyabeans

Milk protein is the best protein. It is complete and it is in the most assimilable form. The percentage of protein however, is low being only 4%. 30 grams of protein are the minimum that the human system needs. To procure this much from milk one has to

PROTEINS IN FOOD

take nearly 1,000 grams or roughly 2 lbs of milk which by the way will give 650 calories

Amongst cereals the protein of wheat (Atta) was given the highest place but now rice protein is considered to be equally good, if not better. Wheat or rice protein supplemented by protein from peas is capable of giving a good composition for body building

Where milk is not easily available or costly, poor people may very well depend on the protein of rice or wheat supplemented by the protein of legumes

The protein of maize has a slightly lower nutritional value than that of wheat. Peas, beans and other dals contain about 23% protein and therefore, are valuable as a source of protein. Chemical analysis has revealed that these proteins are more adequately constituted than those of wheat and maize, but they are not complete proteins

Soya bean is very rich in proteins. The proteins of soya bean are of a high order of nutritional value

CARBOHYDRATES

Carbohydrate is a class name which includes starch and sugar. Sugar is the form in which carbohydrates circulate in the plants and starch is the form in which carbohydrate is stored up. When a plant manufactures more carbohydrates than it wants for its present need, it stores the surplus in the shape of starch. When it is in need of carbohydrate, some of this store changes to sugar by ferment. The soluble sugar then circulates through the plant. Sugar therefore, is the soluble form of carbohydrate. Sugar has been compared to current coin and carbohydrate to bullion in bank. At the time of need the bank melts the bullion into current coins. The two substances are mutually convertible in the life-process of plants, sugar being made from starch and starch from sugar. When we eat starch it has first to be converted to sugar before it can be available for circulation. Starch in the cereals is meant for the food of the seedling.

The starch grains are enclosed in the tiniest sacks of cellulose. Starch is insoluble and therefore, there is no chance of the starch being washed away from plants by rain.

On boiling starch grains swell and burst to form a gelatinous solution in water. Cooking is therefore, bursting of the cells.

SUGAR AND STARCH GLYCOGEN

Starch also can be swelled and made to burst in the stomach. But this operation should best be performed outside by boiling. Such starch is then more easily reactable by digestive juices for conversion to sugar. Starch can be converted into sugar by boiling with dilute acid. By heating or frying simply, it is partially dextrinised or converted into a form of sugar.

Cellulose is also included in the carbohydrate group. But it is extraordinarily insoluble. The human system cannot make cellulose soluble. If it could, then grass and paper would have served as our food.

Many vegetable bodies such as cereals, tubers, roots contain starch along with some protein and mineral salts.

It has been indicated that proteins are nitrogenous bodies which go to form meat or muscle in animal body. Similarly carbohydrates are combustible substances which burn in the system to give energy. Their chief value lies as the source of energy production. In some cereals such as rice and flour besides starch, the protein content is considerable, ranging from 5 to 12%. Sugars are however more or less pure carbohydrates and supply the need for energy merely.

Sugar may be divided into several classes. Cane sugar or beet sugar and milk sugar are sucroses or disaccharides. These require breaking up before absorption.

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The breaking up of sugar can be done by a little boiling with acid outside the animal system or within the system by the action of enzymes. Sucroses in strong solution irritate the skin as also the lining of the stomach. It is advisable, therefore, to take sugar in dilute solutions, otherwise injuries to the walls of the stomach or intestines may result.

The other classes of sugar are called glucoses, the examples of which are dextrose, grape sugar and levulose. These sugars get immediately absorbed into the system. Herein lies the value of sweet fruits in diets.

Carbohydrates, after introduction into the system begin to change. Starches are acted upon by saliva and the process of conversion to sugar commences. On entering into the stomach this reaction stops. Changes commence again in the intestines where the starches get converted to absorbable form of sugar. Cane and milk sugars which cannot be absorbed as such get split into absorbable form.

The plants conserve the extra stock of sugar by converting it into the insoluble form of starch. In the human system also something similar to this happens but in a somewhat different manner. Sugar circulates in the blood stream and penetrates into the muscles to act as fuel. Any extra quantity which is not immediately needed, is stored in some organs, mainly in the liver as glycogen in an insoluble form.

FATS AND MINERAL SALTS

Fats

Fats contain the same elements as carbohydrates. Only the proportion of hydrogen is much more in fat. For this reason fat gives off more heat in burning and has therefore greater fuel value. From one gram of carbohydrate 4 calories of heat are generated, while from one gram of fat 9 calories of heat are generated. Fat therefore, has nearly two and a half times the fuel value of carbohydrates.

Fat is found in milk, butter and ghee, in nuts, oil seeds and in animals. Fat is deposited in the animal body as a protecting coating and for rounding. Fat is found lining the undersurface of the skin. It is on the stomach walls. Here fat serves the important purpose of protecting the stomach from injurious action of some of the bye-products of digestion. If there is too much acid in the stomach it would ordinarily injure the lining but in the presence of fat the acid is emulsified and leaves the stomach uninjured. When more than necessary food is taken, a portion is kept stored in the liver as glycogen. But if more assimilable starch or fat than is necessary for immediate consumption be presented to the blood or if such starch or fat be beyond the storage capacity of the liver then it is converted into fat and stored under the skin. Fats of some

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animals are so assimilable that they get deposited quickly on eating even without altering the colour they originally had.

Fatty foods are more difficult to digest than starchy foods. Fat is to be taken in relatively small quantity. But it may be asserted that one can do without fat altogether. In that case, starch has to supply the fuel needs and get itself converted into fat for storage. While carbohydrate may take the place of fat, fat cannot conveniently displace carbohydrate in food. If all the fuel necessary for the maintenance of the body is taken in the form of fat alone, then it will upset the digestive system

Fats and carbohydrates play an important role in maintaining protein equilibrium. If a man be brought to a condition of protein equilibrium and then be fed more on fat than on protein then the protein balance is disturbed and more protein is thrown out with excreta than is fed. If the food be such that nearly half the calories comes from fat then there is not much appreciable effect on protein equilibrium. Fatty foods leave the stomach slowly to give a feeling of satiety. So they are valued foods

Animal fats like butter, cod liver oil contain vitamins but vegetable fats do not. Again, fats having a lower melting point are more easily broken up than those having higher melting points. Otherwise vegetable fats are as good as animal fats. Oils from cocoanut, gingili, ground nut and linseed are quite good food materials and supply the needed fat in food

MINERAL CONTENTS OF FOODS

Mineral Salts

Many mineral substances get into the composition of human body and these must be supplied with food. An analysis of the ash of food materials gives an accurate idea of the mineral contents of foods. But it is no absolute guide, for some of the minerals may be in such a combination that they cannot be assimilable. There are phosphorus in brain, iron in haemoglobin and calcium in bones. In diseases arising out of deficiency of these substances, the salts of these minerals may be given in an inorganic form to meet the purpose. The form in which these mineral substances are to be presented for assimilation, depends on many factors. When there is iron deficiency in blood it may not do to dose the patient with iron salts. Iron may be assimilated but even then it may not go towards the making up of the demand for haemoglobin. It has however, been experimentally proved that animal organism is capable of utilising inorganic compounds of sodium, potassium, chlorine, iodine, phosphorus and iron when other sources of supply of these elements are cut off. There is a peculiarity about the way these salts inter-relate. If large quantities of potassium are taken in, the sodium reserve of the body is depleted thereby. Similarly if magnesium be administered in large dose, it may throw off calcium from the system so that a negative balance of calcium may be brought about. On the contrary, introduction of calcium exerts a beneficent effect upon the system.

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So much so, that the system can maintain iron equilibrium on an appreciably smaller supply of iron

The following analysis of a human body will be of interest :—

Oxygen	90	lb	Sulphur	$3\frac{1}{2}$	oz
Carbon	35	„	Floine	$3\frac{1}{2}$	„
Hydrogen	15	„	Potassium	3	,
Nitrogen	$2\frac{3}{4}$	„	Sodium	$2\frac{1}{2}$	„
Calcium	$3\frac{3}{4}$	„	Magnesium	2	„
Phosphorus	$1\frac{1}{2}$	„	Iron	$1\frac{1}{2}$,
Chlorine	$1\frac{1}{2}$	„	Silicon	1	,
			Manganese	$\frac{1}{2}$,

Nature has provided all above mineral substances in organic form in the vegetable world fit for consumption and assimilation both by men or animals. Some mineral substances are required in very small quantity and their supply may be had from any diet. Oxygen, carbon, nitrogen and hydrogen we get from any combination of cereals, fats and carbohydrates that we may use as staple food. Next to them are calcium and phosphorus. We have to see to it that our diet contains them in proper quantity. Iron although required in small quantity is an essential mineral substance. So sufficient iron has daily to be taken in. Iodine is yet another important substance. We require it only in minute quantity but it very largely influences our health.

Calcium :— Calcium is the chief ingredient of lime or chalk. In the animal system calcium is

CALCIUM IN MILK AND FOOD RICKETS

needed for making bone which is principally calcium phosphate Calcium is necessary for making the heart work properly and also giving coagulable character to the blood Children have to build their bones, therefore they require much more calcium than adults Pregnant women and lactating mothers require larger quantities of calcium for meeting the need of bone building for the foetus and for suckling children If the expectant mother or the mother is not given a sufficient amount of calcium then she will be drawing upon her own bones to meet the requirement of the foetus and the suckling The bones of the mother in such a case are injured but the effect of such injury may not be felt or be apparent soon

An adult excretes daily about 0.5 gram of calcium In order to maintain equilibrium this quantity of calcium or to be on safe side, a little more (0.75 gram) has to be taken in daily

A pound of milk a day contains all the calcium a child may need. For every pound of body weight a growing boy requires three times as much calcium as a man It should also be remembered that calcium helps our body to utilise properly fats and iron

Because bone is of an apparently stable structure, it should not be assumed that calcium metabolism in adults comes to a standstill Disuse or too much use brings about considerable alteration in bones In fact calcium has fairly good influence on the human system Calcium deficiency gives rise to rickets, to

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softening of bones, decay of teeth and general bodily weakness More than any other ingredients calcium is very often lacking in our diet

Meat, milled or polished cereals, tubers and roots like potatoes, radishes etc. and sugar are poor in calcium. Milk alone of all other foods supplies an abundant amount of calcium Dal, fruits and green leafy vegetables are comparatively rich in calcium In order therefore, to maintain proper balance of so important a material as calcium, the diet should include milk or unpolished cereals, dals or leafy vegetables.

Gram of calcium per 100 grams of substances

Meat	·007	Beans	·160
White of eggs	·067	Beets	·029
Egg yolk	·137	Cabbage	·045
Milk	·120	Carrots	·056
Wheat (unpolished)	045	Potatoes	·014
Rice (polished)	·009	Oranges	·045
Rice (unpolished)	08	Almonds	·239

Phosphorus :—It is an integral part of the structure of cells. It contributes largely to the bony structures and bones Teeth are principally calcium phosphates. It is found in organic union with proteins, fats and carbohydrates Phosphorus aids the working of the various glands It is particularly found in milk and in the sexual elements. It is perhaps the most widely distributed of all mineral substances. It occurs as (a) inorganic phosphate, (b) in combination

PHOSPHORUS IN FOOD STUFF

with fat as phosphatids of which lecithin is a common example, and (c) in combination with carbohydrates Phosphorus functions in many ways It is an important constituent of blood and is essential to the growth of the body and the brain

Meat and flesh contain rich stores of calcium and also rich stores of phosphorus Milk, unpolished rice, wheat, dal, radish, cucumber, carrot and cauliflower contain plenty of phosphorus

Phosphorus in gram per 100 grams of
food materials

Meat	218
White of eggs	180
Egg yolk	524
Milk	.093
Wheat entire	423
Rice polished	096
Beans	471
Carrots	046
Beets	039
Potatoes	058
Turnips	046
Oranges	021
Almonds	0465

Foods rich in phosphorus should be mixed with food rich in calcium Intake of more phosphorus and proportionately less calcium leads to deficiency Bones and teeth are then imperfectly formed

NUTRITION

As a result of extensive investigation it has been ascertained that for safety 1.5 grams of phosphorus per day for a male adult is necessary. Proportionately to body weight more is necessary for children and women, particularly during and after pregnancy.

Iron :—The importance of iron in the functioning of the body had been understood long before the great importance of calcium and phosphorus was realised. That iron is an ingredient of the haemoglobin is widely known. But iron is present not only in the red blood corpuscles but very generally in all active cells of both animals and vegetables. Iron is an essential part of the structure. It stimulates the functioning of the vital process and is therefore very important. But unfortunately although it is so prominently useful in vital activities, the human body contains little reserve of iron and practically we live a hand to mouth existence as regards iron is concerned.

Growing children and nursing mothers require more than men. Women need more iron to meet the needs for menstruation, pregnancy and lactation. Children need it as a building material for blood and cells which have to keep increasing rapidly during the period of growth. Milk is poor in iron but the young before its birth draws an abundant supply of iron from the mother and stores it away. The foetus must have the store of iron from its mother, no matter whether she can spare it or not. It is why under-fed pregnant women grow so anaemic. In men,

IRON IN MILK

the percentage of iron at birth is three times as much as at maturity

Although milk is not rich in iron, it contains iron in the most assimilable form and the amount though small is appreciable. Abundant iron is contained in the outer coatings of cereal grains, which is removed by polishing.

The value of unpolished cereals as food has, therefore, to be borne in mind while considering the mineral constituents of food stuffs. Besides the cereals, vegetables and fruits are as a rule rich in iron. Herbivorous animals therefore are less likely to suffer from anaemia than carnivorous animals. When men depend upon a meat and fish diet and take milled cereals, they invite a break-down of the system. Fatty foods, sugar and purer forms of starches are very poor in iron.

Experiments have shown that the food of an average adult man should contain daily 015 gram of iron.

Iron in gram in 100 grams

of food materials

Meat	03	Beets	006
White of eggs	03	Peas dried	05
Egg yolk	08	Potatoes	01
Milk	002	Spinach	03
Wheat unpolished	05	Oranges	002
Beans dried	07	Almonds	.03
Beans fresh	01		

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Assimilation by the body of mineral salts is difficult. Experiments have shown that rabbits made anaemic by being kept on milk as the sole source of iron, which by the way cannot meet the iron requirement of adults, failed to get over anaemia by the addition of inorganic iron, although the animals were then found to make good progress in growth for a time. Inorganic iron mixed with some vegetable juice, even when the milk is freed from iron, was found to prevent anaemia. It has become clear that something in the vegetable juice enabled the organism to link up in the iron to form haemoglobin. Milk with iron and chlorophyl yielded the result. Evidently something other than iron was necessary to be added to milk and iron to make haemoglobin. From this it can be concluded that milk when supplemented by iron from vegetables or inorganic iron mixed with vegetables can meet the iron deficiency in the system but milk or inorganic iron alone cannot. The liver stores iron. And liver given as food, has been found to help the patient to recover from anaemia rapidly.

Magnesium, Sodium & Potassium :— Generally diet contains requisite quantity of these however constituted they may be. An excessive intake of magnesium induces calcium deficiency which can be overcome by intake of more calcium. Similarly a large intake of potassium, which is present in all plants and plant products, induces sodium deficiency. This explains why the herbivora exhibit such an

COMMON SALT CHLORINE AND IODINE

imperative desire for sodium in the form of common salt. Man takes ample quantities of sodium salt in the usual diet. We are apt to err on the right side by taking too much common salt. When a quantity of vegetable is taken, a little salt is necessary. But if too much is taken then it may injure the kidneys and the blood vessels.

Chlorine & Iodine — Chlorine appears in the body as chloride. Hydrochloric acid, a product containing chlorine and necessary for digestion in the stomach, comes from glands which receive it from blood. Chlorides play an important role in blood in keeping the cells in the proper state of pressure equilibrium. Iodine is necessary in extremely small quantities. Sea is the chief source of iodine. The more remote a place from the sea is, the less iodine is in its soil and therefore, the less does its vegetation contain. Iodine is stored in the thyroid gland. In minute quantities it is also found in the tissues. Deficiency of iodine will give rise to thyroid diseases. Too little iodine in the food tends to cause swelling of the neck known as goitre. Iodine in the form of potash iodide or tinct iodine can cure the disease. Iodine helps the body to make proper use of calcium and the fat contents of the food.

In closing the subject of mineral requirements it may, by the way, be mentioned, that one has to select a diet so that it includes salts in their most suitable forms as organic compounds. Not that the organic compounds are assimilated as such, but that

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the organic compounds on their break-up, render reconstruction of compounds for the human body an easy task.

The mineral constituents are present mostly on the outer coatings of cereals and pulses. Precaution should therefore, be taken to avoid altogether the use of polished rice or wheat. The salts are in abundance in vegetables and fruits and particularly in leaves. If therefore leaves and vegetables are taken in plenty along with unpolished cereals and dals then there is little risk of deficiency occurring.

Fish, meat, liver and eggs contain much of the mineral ingredients required by the system. Those who have no objection to take them may look to them for these but even then they have to be supplemented by plenty of vegetables in order to blend them into dependable food. We need not however, go to them at all for mineral salts. Milk is an ideal food and can meet all the mineral requirements except iron. Cereals and dals, milk and leafy vegetables will supply all that are needed to nourish and maintain the body.

VITAMINS

Vitamins are food accessories They are the lives of food They are necessary for the assimilation of food Blood needs them to carry on its function The vitamins are present in the minutest quantities in some food materials It may be said here that their minute character has so far baffled all attempts at separating or weighing them in a pure form

They have been found out by research workers in their attempt to determine the proper value of foods and to find the cause of some diseases The vitamins are named A, B, C, D, E etc

In the course of experiments on relative value of foods vitamin A was found We have seen that food should consist of proteins, carbohydrates, fats and mineral salts When these were given in their chemically purest form, it was found that the growth of the animal under observation was stopped and then it died Food however, full in its content of the necessary proteins, carbohydrates, fats and mineral salts, could not sustain life In one such experiment, the sugar of milk given contained some impurity This impurity afterwards was found to be the life-sustaining important thing Acting upon this clue, it was discovered that rats dying on chemically pure foods could be made to revive by adding a few drops

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of milk to the daily food. Milk contained something the lack of which in food, arrested the growth and subsequently brought in death. This something was called vitamin A. With the shortage of vitamin A, persons become prone to infection. Vitamin A is therefore called anti-infective vitamin.

Beri-beri was creating havoc in certain quarters. No cause could be found. Ultimately one scientist discovered that beri-beri could be induced in a pigeon by giving it exclusively polished rice as food. The pigeon living on such rice lost appetite, became paralytic and died. But even if in advanced stage of the disease rice polishings were given, the pigeon got well. It was found that the exterior coating of the rice or rice polishings contain something the lack of which induces beri-beri. This substance has been named vitamin B. It is easy to remember the property in vitamin B connecting it with beri-beri or by calling it anti-beri-beri vitamin.

Again, persons in long sea voyage were found to suffer from scurvy. Scurvy is a disease in which a person loses weight, becomes pale, anaemic, weak and short of breath. Gums become spongy. Patches of blue appear on the skin which become hard. The bones become soft and can be snapped. The patient ultimately dies. If such patient be given lime juice before the disease has advanced too far, then the disease gradually disappears. Lime juice can be substituted by juice of any fresh fruit or vegetable. It was concluded that fresh fruits and vegetables.

SOURCES OF VITAMINS

particularly acid fruits contain something the lack of which causes scurvy We may remember vitamin C as being antiscorbutic

Some children who do not receive adequate milk and live in dark rooms without much open air and sunlight suffer from a disease called rickets. Ricketty children are thin, restless, irritable and cry a great deal Their bones become soft and bend and the muscles are flabby This is because the food of these children lacks a substance called Vitamin D Vitamin D is called antirachitic

Whole grains or rice or wheat containing the embryo and some vegetables contain something, and this thing gives reproductive power If rats are given food which does not contain whole meal or certain vegetables, then they lose reproductive power and no young is born, or if any born, it dies soon. This is because of a lack of a substance called vitamin E or anti-sterility vitamin

There are several other vitamins that have been known but the above are the most important ones It is quite likely that many more vitamins will be found But even if we do not know all about them now, it need not disturb us A study of the vitamins will show that if we give up the craze for refined foods and revert to more unpolished, unrefined foods, raw vegetables, fruits and have plenty of sunny open air life, then we need not worry about the lack of vitamins We do not run to a chemist for vitamins Nature is the greatest store-house of vitamins

NUTRITION

Vegetarian food, eggs and milk contain large quantities of vitamins. We have simply to turn to nature and secure healthy food. In short, if whole grain cereals, dals, milk, some raw vegetables along with some tamarind or lemon be taken in quantity, and properly chewed and if sufficient exercise is taken and sunlight enjoyed, then the vitamins may be left to take care of themselves whatever be their names.

Milk, eggs and the embryo of cereals are all materials designed by nature to build or nurse the young ones of animals and plants. Therefore they contain plenty of life-supporting substance. If therefore there is any risk of deficiency, these foods in a raw condition will make up for that deficiency. In the following pages we shall give more detailed consideration to the vitamins and foods containing them.

Vitamin A

Vitamin A is an essential substance for animal life. But animals cannot produce it themselves. At least experiments have so far failed to establish that animal body can manufacture vitamin A from non-vitaminous substances. Vitamin A occurs in green leaves. Herbivorous animals get vitamin A from their food, utilise it for daily necessity and also store it in their liver, kidneys and fat. It is a fat soluble substance. Animal fats generally contain vitamin A. Vitamin A being necessary for immediate growth of young ones, nature provides for this substance in the

VITAMIN A IN EGGS AND MILK

seeds in their embryo It therefore necessarily follows that eggs should contain vitamin A, otherwise new born creatures cannot get nutrition or maintain life Nature has provided for it in mother's milk so that the nurslings may have it We can rationally follow up this argument and say that if a cow be not fed on green fodder rich in vitamin, then its milk contains less vitamin and therefore, is of poor nutritional value Again if mothers are not given sufficient supply of vitamin A, the foetus in the womb does not properly develop The new born child must have its full quota of vitamin A from mother's milk It is idle to expect that the children of mothers who suffer from vitamin deficiency, should live at all or be healthy If we go into the causes of infant mortality we shall find that a large number of deaths are due to the deficient food which mothers take or to the fact that children after their birth do not have sufficient supply of vitamin A

The mother-cow receives the vitamin from the herbage that she takes and stores it in her milk for the calf The calf receives its vitamin supply in its earlier days from the mother and when it is weaned, it takes vitamin directly from the green herbage With human beings the thing is not quite as simple During the first few months of its life the baby receives all its nutrient from the mother When the mother is supplied with food rich in vitamin, everything goes allright If however there be lack of vitamin A, then both the baby and the mother

NUTRITION

suffer. A child which has outgrown the sucking period, has to get this vitamin from other sources than the mother's breast. It may get it from the milk or from leafy foods or fruit juice that it may eat. The rawer the food, the richer it is in vitamin. Raw cow's milk taken fresh from the udders is much more valuable than boiled milk.

For grown-up men, vitamin A must come either from fruits, leafy vegetables or from animal sources. As to animal sources, the muscle meat contains the least of it. Fat has a little more vitamin A than muscle meat has. But the greatest store of supply is in the liver. Fishes like anchovies take vitamin A from the weeds that grow in water. Fishes store them in the liver. Necessarily fish liver oils are very rich in vitamin A. This is why cod liver oil is so common a prescription. The recognition of the fact that the liver contains a supply of vitamin A and that this vitamin is necessary for the growth, has solved the problem of rearing up the youngs of carnivorous animals in captivity. They are now fed with whole animals and get all that is necessary for the system from them. Confined to muscle meat only, they cease to grow and die.

Vitamin A is remarkably associated with yellow pigmentation, though the yellow pigment itself or carotin is not vitamin A. The yellow skin of cucumber or yellow or red chillies contain vitamin A. Tomato while green does not contain vitamin A but when it changes colour to red or yellow vitamin A

VITAMIN A AND YELLOW PIGMENT

develops, no matter whether the development of the colour occurs either in plant or after it has been plucked. Green shoots have the power to synthetise vitamin A.

Leaves are the principal synthetisers and stores of vitamin A in plant as the liver is in animal. Roots and tubers have little of vitamin A. Those of yellow colour such as carrots have some vitamin A.

White leaves have little vitamin A as compared with green leaves. Similarly seeds contain vitamin in their embryo. Polished rice or wheat from which embryo has been removed contains no vitamin A.

While animal fats contain vitamin A, vegetable fats and oils contain none. Of vegetable oils, cocoanut oil only contains a little of it.

Food containing vitamin A can be cooked without much loss of vitamin. Every time it is heated, it loses however a portion of vitamin. If it be kept heated, then oxygen acts upon it and destroys the vitamin. Milk which is kept over a slow fire for a short time contains its full share of vitamin, the film of cream protecting it from the effects of oxygen. But if it is stirred during boiling then there is a great loss of vitamin. Butter contains almost all the vitamin A of the milk, only a little passing over with the butter milk. Butter when melted into ghee also contains vitamin A and is the common source of vitamin in our food. But if during the process of making ghee the mass is stirred, then loss of vitamin occurs proportionately to oxidation.

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The function of vitamin A in the animal system is to give it growth and keep it in repair. So it is not that children alone need vitamin A but grown-up men also require it for keeping the tissues in proper repair. Another great property of vitamin A is that it wards off infection, and hence vitamin A is called anti-infective vitamin.

We have seen that microbes and bacteria are within or about us. That we are safe from this attack is due to the anti-infective capacity of our system. Disease-bearing bacteria find their way into our system and thrive there when that capacity is gone. Vitamin A gives wonderful tone to the skin and the mucous membrane, rendering them anti-infective. Many diseases enter through the skin or through the mucous lining of our mouth, stomach, trachea etc. By insufficiency of vitamin A these defences are broken down. The skin or mucous membrane becomes weak and less resistant. Bacteria find entrance either through weak spots in the skin or through the mucous lining and bring on diseases. Vitamin A deficiency may lead to inflammation of the eyes, blindness, night blindness, colds, inflammation of the lungs, pneumonia, bronchopneumonia, tuberculosis, inflammation of the bowels leading to diarrhoea, dysentery, diseases of the kidneys resulting in dropsy and stone in bladder. Vitamin A alone cannot keep the skin in health. It must have assistance of vitamins B and C and proper food.

VITAMIN A DEFICIENCY

One of the chief symptoms of extreme want of vitamin A in children is inflammation of the eyes known as keratomalacia. Inflammation causes morbid softening of the cornea. Pus accumulates and attacks the cornea, resulting ultimately to blindness. In another form night blindness occurs. In calves the beginning of vitamin deficiency can be detected by flow of water from the eyes leaving a wet streak. It indicates that too much milk is being taken away from the cow by milking and too little left for the calf. In keratomalacia or night blindness fresh milk will rapidly put a stop to the disease. Meat eaters can take fish liver oil. Cod liver oil is extremely useful. The taking of a large slice of animal liver has been found to cure night blindness in a few hours. The liver may be eaten raw or cooked.

Foods rich in vitamin A are fish liver oils, fish, egg yolk, liver of animals, animal fats, milk, green leaves such as of spinach, lettuce, cabbage, radish tops, turnip tops etc.

Foods having moderate quantities of vitamin A are carrots, cucumber skin, tomatoes, maize, gram etc.

Foods containing little vitamin A are dals, beans, wheat, rice, chillies, cocoanut oil etc.

Foods containing no vitamin A are meat, vegetable oils, polished rice, white flour, onion, banana, radish, potato, beet etc.

Vegetarians should include some raw leaves in their daily meals. They can be made quite as palatable as cooked food if they are sliced and mixed.

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with lemon juice or tamarind with a dash of oil and salt When milk is available a quantity of it included in the diet, will go a long way to correct vitamin A deficiency. Inclusion of butter or ghee in diet will also provide a safeguard against vitamin A deficiency Those who take fish or meat may rely upon small entire fishes, fish livers and fat meat for supplies of vitamin A But the poor should, as they must, look for it in the vegetable kingdom The intelligentsia are slowly getting into the habit of taking green leaves The practice of chewing betel leaves after meals insures the intake of some vitamin *Pan* or betel leaf is, therefore, a necessity but not a luxury to the poor. Any kitchen garden however, may raise leaves which constitute a cheaper source of vitamins than the betel leaves

Vitamin B

The discovery of vitamin B marks an epoch in the chemistry of nutrition Takaki, a young medical officer, in charge of Tokio Naval Hospital was alarmed at prevalence of beri-beri in the navy It was in the year 1887 He says that "Such conditions used to strike my heart cold, when I came to think of the future of our empire, because if such a state of health went on without discovering the cause of beri-beri, our navy would be of no use in time of need" Out of 350 men in one ship 195 were suffering from beri-beri It struck Takaki that the disease might be

VITAMIN B : BERI-BERI

due to faulty diet and he began experimenting in an elaborately big scale.

One after another he sent out two ships similarly manned over the same course for a similar period. One of these two ships had a better ration or rather more rice, more vegetables and much more meat. In the ship with better ration there were only 14 cases of beri-beri and no death, while in the other ship out of 276 men, 169 men suffered from the disease and of them 25 died. The duration of the voyage in both the cases was 272 days. He had put too much stress on meat. But later on he corrected and introduced a new dietary. The total food was further increased, but the measure of rice was decreased and that of wheat increased and 1½ pint of milk added daily. A year later out of 8425 only 3 men got the disease and none died. So beri-beri was tackled with by change of food. After this, Dr Eijkman artificially introduced beri-beri in fowls while they were kept on polished rice only. The disease was cured when rice polishings were given again. The substance in rice polishing, the absence of which brought in beri-beri, is soluble in water and is called vitamin B.

Beri-beri is a form of neuritis. The nerves of motion and sensation are mainly affected. In the beginning there is fatigue and depression, numbness and stiffness of legs, swelling of the ankles, legs and face. But there is also a dry form. In all cases however, the heart is weakened and digestion impaired.

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Beri-beri is not caused by vitamin B deficiency alone. It is due to bacillary action on the intestines hastened by the deficiency of vitamin B. Vitamin B is in the outer coating of rice and wheat. When this outer coating of rice is removed in polishing, rice is divested of vitamin B. If vitamin B is not supplied through other sources, then the person is a victim to bacillary attack and gets beri-beri.

Vitamin B may be assumed to be the most important vitamin for health and well-being. Deficient intake of vitamin B leads to loss of appetite. Other symptoms are taste for unhealthy things, disturbance of normal functions of digestion and evacuation, constipation or diarrhoea, disturbance of vision and glaucoma, weak muscles and a general break-down of health.

This vitamin is not available in a laboratory in a synthetised form. So it must be taken with food. Plants manufacture vitamin B. Men and animals derive it from plants. But unlike vitamin A, plants do not have it in leaves so much as in the seeds. There again it is confined to their outer coating. It is however, present in leaves also. The more important an organ is, the more vitamin B is utilised and therefore stored by it. It is more plentiful in brain than in heart, liver, kidneys and other organs. Organs containing vitamin B if used as food, supply vitamin B. Vitamin B is not soluble in fat but in water. The water in butter milk contains vitamin B but butter contains little or none. In milk it is stored

SOURCES OF VITAMIN B

for meeting the necessity of the suckling child. For the same reason it is stored in eggs also. Milk and eggs are rich sources of vitamin B like A. The food of mothers must be rich in vitamin B, so that they may pass on more of it to the infants they suckle. Shortage of vitamin B is disastrous to children.

The chief sources of vitamin B for men are the cereals. Then there are the pulses, peas, beans, next come nuts of all kinds, then green leaves, milk, eggs and finally animal organs. When molasses is fermented then the sugar is converted to alcohol through the working of a ferment yeast. This yeast has a sort of plant life and is full of vitamin B. In toddy, the white clay-like deposit contains a very great deal of yeast and therefore of vitamin B. Yeast may be regarded as a concentrated form of vitamin B.

We need not go to yeast for this concentrated form. Nature has provided so much of it in the coating of rice and wheat that none need suffer for want of vitamin B. It is therefore, that the husk only should be removed from rice or wheat and the entire coating or bran should be left with the cereal for human consumption along with the embryo. This will ensure presence of vitamins A and B also of mineral substances.

Although vitamin B is essentially necessary for maintenance of the life-process and although it is abundant in our principal food grains still persons suffer from want of vitamin B. It is unnatural, but the progress of so-called civilisation has brought in

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this curious and regrettable state of affairs. The outer coating and the embryo of cereals do not keep for a long time after the grain has been separated from the husk. But rice from which the coating and embryo have been polished off lasts unaffected longer than the unpolished rice. So traders and exporters prefer polished rice to the unpolished rice. On removing the outer coat, the grain looks nicer also. Therefore, the custom of milling or polishing was introduced for rice and wheat much to the detriment of health of the human race. It remained for the nutritional chemist to rediscover the importance of the bran or coatings of grains. Now that we have known this, it would be advisable for every one to get rice or wheat with the coating on. Some persons use hand-pounded rice. But hand-pounded rice is no better than milled rice, if it undergoes the same degree of polishing. But usually it does not. To get the best of it, unpolished rice or wheat must be used. Care should be taken to see that nothing of the coating of cereals is removed during husking. The more the coating is retained, the better food value it has.

But the quantity of rice or atta we take even when it is used unpolished, may not contain enough vitamin B to support us. We should therefore, count upon legumes or dals to supply us the requisite quantity. But even this may not be enough. Then we have to look to vegetables for it. Some of them such as spinach, lettuce, tomatoes contain vitamin B. So

VITAMIN C

vegetables and leaves are doubly important because besides being source of vitamin A, they are good sources of vitamin B also. Vegetables are necessary also to give the food the requisite bulk for evacuation. Cereals like jowar, gajra, millet have a thin husk and are powdered into flour with the husk or cooked whole. Here there is no chance of vitamin and salts being thrown away. Therefore, these constitute better food than the costly polished rice or white flour. The rice bran is an excellent article of food in as much as it contains vitamin B. There is a great difficulty however. It decomposes in about a week's time and breeds insects. It should therefore be consumed fresh. A still better way is to consume unpolished rice or atta containing the entire coating.

Vitamin B is not destroyed by the ordinary process of cooking. It is soluble in water. Care therefore should be taken that the fluids from the cooked rice or vegetables be not thrown off, for then vitamin B will go with them.

Vitamin C

This vitamin is called antiscorbutic because the want of this vitamin brings on scurvy. Fresh green vegetables and edible green leaves contain this vitamin in plenty. It is also found in fruits, particularly in sour fruits. It is not present in cereals and pulses. But germinating pulses develop

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vitamin C. Where edible green fruits and leaves are not available, germinated wheat or gram or mung may very well be taken for the supply of this necessary vitamin. The sprouted grains should be eaten raw.

Like vitamins A and B, vitamin C also is stored by the liver. So, carnivorous animals obtain their supply of these three vitamins from the liver and blood of their prey. Milk has vitamin C also as it has the other two, but comparatively only in small quantity. So it does not do to depend upon milk for the supply of vitamin C. It must be supplemented by leaves and fruits. It is very sensitive to heat. Cooking or heating destroys it. Mothers would do well to bear this in mind always. When boiled milk is the staple food of an infant, some green juice either of leaves or of fruits must be added to it to maintain the baby in health. Vitamin C is an auxiliary to the vitamins A and B. It helps to keep health generally. Scurvy is not the only indicator of vitamin C deficiency. It is rather the final stage of vitamin C deficiency. Loss of appetite, paleness, anaemia, lassitude, irritability, offensive breath, unhealthy look, spongy bleeding gums and bad teeth are the symptomatic indications of vitamin C deficiency. If an infant cries on the slightest handling, it shows that the infant is suffering from vitamin C deficiency as also D deficiency. The white inside of the peel of the oranges is particularly rich in vitamin C. Tomatoes are very rich in vitamin C.

SUN'S RAYS AND VITAMIN D

Regarded as a source of vitamin C, animal food is no good. Eggs have no antiscorbutic property. Liver has but very little of it. The quantitative presence of this vitamin in milk depends upon green fodder which the cow consumes. It follows therefore, that a nursing mother must have adequate green leaves included in her diet to ensure the transmission of a good supply of the vitamin to the child. The baby itself may with advantage be given orange, lemon or tomato juice. The amount of vitamin C found in an ounce of orange juice, is found in just half that measure of fresh cabbage leaf juice, in 3 to 4 pints of milk, in 2 lbs of turnips or grapes, 1 pound of carrots, $\frac{1}{2}$ lb apples or potatoes. As vitamin C is destroyed wholly or mostly in cooking, raw vegetables or leaves should form part of food. Vitamin C is necessary in abundant quantity to keep the blood pure and the teeth and gums and generally the whole of the body in health.

Vitamin D

The want of this vitamin induces rickets. It is a disease of the children in which the bones are not developed and so are weak and soft. But it is not confined to children alone. It is called osteomalacia in older persons. These diseases are caused by improper formation of bones and teeth for want of proper component materials or for want of the forming agency. The materials are mineral

NUTRITION

substances, calcium and phosphates If these are present in unbalanced condition then proper formation of bones can not take place. But even the presence of these substances in fair proportion, is of no avail without an adequate supply of vitamin D, the forming agency Lack of it is responsible for malformation of the body

Infants of weak mothers get insufficient mineral supply from their mothers' milk. In such cases they may develop rickets During pregnancy and during suckling period, there may be much more draw upon the mineral resources of the mother than she can recuperate The result in such instances is also the same ; the mothers' bones get softened and their vitality reduced.

Fortunately we need not depend upon food for the supply of vitamin D The human system can synthesise vitamin D from sun's rays Therefore children having a lot of outdoor life hardly develop rickets The practice of exposing infants to sun smeared well with mustard or other oil is a good method of imbibing vitamin D. Vitamin D is fat soluble and is contained in animal products such as milk, butter, ghee, yolk of eggs and fish oil Fish liver oils are particularly rich in it Vegetable oils develop vitamin D on exposure to sun

Softening of the bones is an indication of vitamin D deficiency But it is an extreme one Children whose food is deficient in vitamin D are nervous, cross and do not sleep well They have flabby

VITAMIN D AND BONES

muscles and ultimately the bones become soft. The muscles of bowels become slack causing the belly to protrude forward and making the spine bent. In advanced cases the children become bow-legged. They look pale and anaemic, catch cold and get easily infected. Poor teeth also indicate absence of vitamin D in children. The teeth when they come out from the gums are sound, but with growth dental caries appears and cavities form in the molar teeth. Further infants suffering from Vitamin D deficiency cry out on the slightest handling.

It would be wrong to conclude that deficiency as shown in rickets or osteomalacia is due only to the absence of sunlight. Food must contain the right proportion of bone-making mineral substances of calcium and phosphorus. In their absence plenty of exposure to sun is of no help. The question of supplying sufficient mineral constituents of human body has been dealt with. For minerals we have to look to vegetables and also to milk.

TOWARDS A BALANCED DIET

We know now that food must contain proteins, fats, carbohydrates and minerals in proper quantity and that along with them the life-giving substances—vitamins A, B, C, D, E etc. must also be there. Their existence in due proportion is called the balancing. A man may take proteins, fats, carbohydrates and vitamins and yet may not be in health. Men have by tradition become accustomed to particular forms of diet. All customary diets are not necessarily good. Changes brought on by environments and circumstances have changed the dietary habits of man for the better and sometimes for the worse also. In India our problem is to find out a balanced diet, but what is more important and imperative is that it must be very cheap also. The manner of our dietary varies often widely, from province to province and also according to broad religious and sectarian divisions. Poverty notwithstanding, till recently we somehow managed to have something like a balanced diet. But of late we have indiscriminately bowed to the so-called civilisation which has disturbed the rationality of our dietary habits for the worse. We have taken to refined food-materials, polished rice, white flour, white sugar etc. without even so much as caring to appraise their worth or to determine if that change is for the better or for worse. With the advancement of knowledge we know today that

FOOD REQUIREMENTS

refined food materials have done us immense injury rather than good. Fortunately we now know how much of what goes to maintain life and health. And in the light of that knowledge we can now make a diet table that can meet all the requirements of the body.

First we want an amount of food as fuel. This fuel we measure in calories. We know that an adult weighing a maund and a half or 60 seers requires 60×24 or 1440 calories per day, just to keep the system going. To this we may add at the rate of 100 calories per hour or 800 calories for an ordinary eight-hour working day. The total daily need is then 2240 calories.

We have seen that the minimum protein requirement may be put at 2 ounces per day. Minerals which we require only in small quantities and the necessary measure of which we need not punctiliously determine, we may derive from vegetables. In tabulated form our requirement is as under:

Food requirement of an adult for an
eight-hour working day

Calories—2240 to 2500, proteins—2 ounces, fats—2 to 3 ounces, mineral salts: calcium 0.5 gram, phosphorus—1.5 gram, iron—0.15 gram, vitamins A, B, C, D, E etc

We shall now try to build up a dietary formula to meet the above requirements. For fuel we have to depend mainly upon starch in rice or wheat. For proteins we depend upon the contents of rice, wheat

NUTRITION

and dals. For fats we depend on vegetable oils. In choosing articles we have to bear in mind that we do not take pure proteins or pure carbohydrates and that each item of the diet gives us several components. In constructing a chart we have not only to keep an eye to the caloric values but also to their relative proportions. We know that one gram of carbohydrate and one gram of protein, each gives 4 calories of heat and that a gram of fat gives 9 calories of heat. For example, let us take rice. We get all the three substances, viz., proteins, fat and carbohydrates in it. But if we want to take all the calories we require from rice alone, then we get too little of other substances, namely protein, fat and minerals. We shall examine its effect.

Standard requirement	From 25 ounces unpolished rice		From 25 ounces polished rice	
Energy	2500	2500	2500	
Protein	70 grams	62.5 grams	56.7 grams	
Fat	... "	.. "	..	"
Calcium	0.5 "	0.8 "	0.02	"
Phosphorus	1.5 "	1.5 "	0.67	"
Iron	.015 "	0.012 "	0.006	"
Vitamin A	...	...	...
" B	...	...	...
" C	...	...	...

From 25 ounces of rice we may get 2500 calories of heat which is sufficient for fuel purpose for an

CARBOHYDRATES, PROTEINS, MINERAL SALTS

adult Unpolished rice gives us one sort of nutrient and polished rice another sort Either of them falls short of the standard nutriment we need for health

Taken in 3 meals, this quantity of rice (25 oz) is not too bulky for the stomach accustomed to it. Healthy rustic adults whether of Bengal, Behar or Orissa will not consider 10 or 12 ounces of rice in their two principal meals, too big a dose With many this is the usual quantity We shall analyse to see what we get from this quantity of rice polished and unpolished.

Carbohydrates :—Of course rice will give all the carbohydrates necessary.

Proteins —25 ounces of polished rice gives 56.7 grams of protein while that quantity of unpolished rice gives 62.5 grams By itself the quantity from either source is not very low. But the proteins of rice are not complete proteins that we need They are lacking in certain components and therefore do not supply proper nutrition An exclusive rice diet though it may supply the needed calories, cannot meet the protein requirement of food So we have to partly replace rice by some such material as will complement the need for complete protein

Calcium —Polished rice has only 02 gram of calcium and unpolished rice 08 gram, but our daily requirement is 0.5 gram Therefore polished rice can but meet 1/25th and unpolished rice 1/6th of our need only Any way neither the one nor the other meets our calcium need We must need look to other quarters for it

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Phosphorus :—Unpolished rice meets the requirement but polished rice gives us only half the necessary quantity.

Iron :—Here again unpolished rice will give all that is required but polished rice will give practically nothing at all.

Vitamins :—Unpolished rice supplies a little of vitamin A and much more of B, but nothing of C. Polished rice gives us little by way of vitamins A, B, C. So a man who attempts to maintain himself on polished rice only, will succumb earlier than the man who takes unpolished rice only.

Correction of this deficiency means an approach towards a balanced diet. The foregoing analysis shows that we need fats and vitamin, more proteins and more mineral salts.

The fat requirement we may meet by taking oil. From one ounce of oil we get 28 grams of fat. It may meet the fat requirement to a great extent aided by the conversion of starch into fat. For every ounce of any vegetable oil we may take we have to reduce $2\frac{1}{2}$ ounces of rice to keep the calories constant, viz., at 2500 because one ounce of fat gives 250 calories which is equivalent to $2\frac{1}{2}$ ounces of rice. The quantity of rice is thus reduced to $22\frac{1}{2}$ ounces from 25 ounces.

For proteins we should now look to dals. Dals contain 25% protein so from 4 ounces of dal we get one ounce of protein. This not only increases the total amount which was rather short of the

VITAMINS AND MINERAL SALTS IN FOOD

requirement but helps to make up the deficiency in quality. But 4 ounces of dal give 400 calories and therefore in order to maintain the balance, we have to make a further reduction of 4 ounces of rice and bring it from $22\frac{1}{2}$ to $18\frac{1}{2}$ ounces.

For the supply of vitamins we have to exploit the vegetables. 16 ounces of vegetable is a decent quantity but if a little of it be taken raw, a less quantity will do. Taking it to be 16 ounces we get from it 8 grams of proteins and approximately 100 calories. This necessitates a still further reduction of rice by another ounce because an ounce of rice is equivalent to 100 calories. So our rice requirement comes to from $18\frac{1}{2}$ to $17\frac{1}{2}$ ounces.

In order to take the fullest advantage of the vegetables, some quantity should be taken raw for vegetables in their natural state only contain vitamin C. By proper selections vitamins A and B also come in.

Vegetables not only give vitamins but they also give the required bulk to the food which is a necessity for the proper functioning of the organs of evacuation. In other words we may say that vegetables supply what in technical term is roughage.

Mineral salts — By providing proteins and vitamins we automatically correct the mineral salt deficiency of rice. Dal contains a quantity of the required mineral salts and so do vegetables. The much needed calcium we can have from 4 ounces of dal included in our diet.

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Balanced diet :—A balanced diet then stands thus —

	Proteins Grams	Fat Grams	Carbohy Grams	Approx Calories
Rice unpolished				
	17½ oz	40	3	440
Oil	1 „	... 28	65	250
Dal	4 „	26	4	65
Vegetable	16 „	8	1	16
		74	36	586
				2500

We shall compare these results with those advocated by Dr. McCarrison, late Director of Nutritional Research Institute, Coonoor. According to him a balanced diet should consist of things in the following proportion :—

Proteins	60 to 70 grams	Calories 240 to 280
Fats	50 — 60 „	„ 450 — 540
Carbohydrates	360 — 450 „	„ 1440 — 1800
		Total .. 2130 — 2620

Comparing we find that we have provided for a little less fat and more carbohydrates in correcting the exclusive rice diet to a balanced diet. Further correcting the diet to approximate it to McCarrison's recommendation, we get as under.—

	Ounces grams	Protein grams	Fat grams	Carbohy grams	Approx Calories
Rice (unpolished)	16	37	3	400	1600
Dal	4	26	4	65	400
Oil 4 tolas	1.6	-	45	-	400
Vegetables	16	8	1	16	100
		71	53	481	2500

BALANCED DIET . LEAFY FOOD

In the above dietary table milk, eggs, fishes and meat have not been provided for One or the other of them is necessary and if these can be obtained they should be used and rice or dal reduced to keep proteins and calories within limit Taste, prices and the extent of poverty make difference

In a country where in the villages a family with an annual income of Rs 25 per head may pass as rich, a dietary formula has to be found that will be within the limits of means But in order to maintain health and fitness either milk or fish should be given a place, in addition to vegetables as a corrector Where milk and fish cannot be procured cheap, raw vegetables of proper quality will meet nutritional requirements

In the search for making up a balanced diet for a poor country like India, a look into the dietary condition of some Italian peasants will be able to throw a considerable light We have to build sound bodies from cheapest available materials and here is what we find in "Home and Community Hygiene" by Broad Hurst (Lippincot)

"An interesting illustration of a balanced diet is given by Lusk in the peasants of Southern Italy, who live mainly on corn meal, olive oil and green stuffs and have done so for generations There is no milk, cheese or eggs in their dietary Meat in the form of fat pork is taken three or four times a year Corn meal is taken as 'polenta' or is mixed with beans and oil oil is made into corn bread Cabbage or the

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leaves of beets are boiled in water and then eaten with oil flavoured with garlic or Spanish pepper."

It therefore appears that the balanced diet sketched above has practical support of the dietary habits of peasants of Southern Italy.

It may be mentioned in this connection that it is quite possible to build a health-maintaining diet entirely on vegetables.

McCollum, Simmonds and Pitz (1916-1917) fed rats a monotonous diet of maize 50, alfalfa leaf (dry) 30, and cooked dried peas 20 per cent. "The ingredients were ground together so that these proportions were eaten. The diet induced growth at approximately the normal rate and reproduction and rearing of a considerable number of young. The young grew to adult size and were successful in rearing a considerable number of offspring without tasting, after weanings anything other than this monotonous diet mixture. The family of rats remained approximately normal in vigour and successfully weaned the young of the 4th generation with no apparent diminution in vitality. The experiment was then discontinued.

Their next series of experiments (1917) was with diets derived solely from a mixture of a leaf and a seed ground together so that the two parts of the ration could not be eaten separately. In marked contrast to the failure of animals to grow on any mixture of seeds, it was found that a mixed diet of a seed and a leaf could maintain growth to an extent.

VEGETARIAN DIET

Polished rice which required to be supplemented by mineral salts, vitamins and proteins to be complete food, was found to induce growth in rats when fed with leaves in the proportion of 60 per cent of seed to 40 per cent of leaf. On this simple and monotonous mixture rats grow from the weaning time to 83 per cent of the adult size. One female produced two litters, but they died. A mixture of rolled oats (60 per cent) and alfalfa (40 per cent) makes a better ration.

The result of this experiment demonstrates that the mineral components of the vegetarian diet supplemented the inorganic nutrients of the seed portion so as to favour normal bone development. It is evident that this diet contained sufficient of the organic factor combined with it for the metabolism of bone. In China and other parts of the Orient where green, leafy vegetables constitute a very important part of the food supply, rickets is almost unknown, whereas it is common in Europe and America, where the tendency is to derive a large part of the food supply from milled cereals, meats, legumes, seeds and tubers.

These experiments made it evident that an animal of the omnivorous type may satisfactorily thrive on vegetarian diet. It is only necessary to make the proper selection of food stuffs and combine them in the right proportions. In the experiments in which the diet was made up of so simple a mixture as a leaf and a seed, optimum growth, reproduction and

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rearing of young were in no case secured McCollum and Simonds (unpublished data) have the results of an extensive series of feeding trials in which the rations were made up of one seed, one leaf and one legume (pea, bean) in various proportions ; but they failed to reveal any mixture which is quite the equal of that used in the first experiment, viz, maize 50 per cent, alfalfa leaf 30 per cent and peas 20 per cent ”

The same authorities observe, “It will be clear from the discussion in this chapter that the vegetarian diet has been considered from the wrong view point It is possible to make a fairly satisfactory diet of foods derived entirely from vegetable sources, but it is not easy to do so. It would be difficult for a man to eat enough leafy foods to enable him to succeed with a strictly vegetarian diet

Millions of people in Asia have learned the unique nutritive value of green plants, which we in America have never learned to appreciate”.

Elsewhere McCollum observes that “Milk and leaves of plants occupy unique positions among available food stuffs, in that they are so constituted as to correct when suitable amounts are included in the diet, the defect of cereals, tubers, roots and meats”

“Again one of the greatest surprises in the history to nutritional research as the discovery by McCollum, Simmonds and Pitz of the unique dietary properties of the leaf as compared with those of the other parts of the plant The knowledge gained in 1916 has

VALUE OF LEAFY FOOD

shown that the cereals, tubers, roots and legume seeds collectively in any proportion could not form a satisfactory food supply for any kind of animal with which experiment has been made. The thought naturally suggests that in the dietary of people who are largely vegetarian, there must be something which supplements the deficiencies of the seeds, tubers and roots. It was found that meats could not serve the purpose since they do not greatly enhance these storage products of the vegetable world with respect to several factors in which they are deficient. Later studies have clearly shown that the leafy vegetables play a very important role in the dietary of many oriental peoples”

That leaves play such an important part is nothing strange in itself. The leaves of green vegetables are the lungs of plants and they are also their livers. And we have seen the importance of livers as store houses of vitamins and mineral salts. With the growth of contact with Europe and Europeans, educated Indians have leaned towards the European form of dietary and discarded the leafy diet to some extent. Amongst the masses the poorest are obliged to depend on leafy food. But now with better knowledge of nutrition leaf should find a place of honour in scientific dietary.

SOME COMMON FOOD MATERIALS

Rice :— It is the staple cereal grain of Bengal, Madras and Bombay Presidencies and of Kashmir and Burma. It is the chief food of more than half of the human race and therefore, deserves the greatest consideration. In India rice is the staple food in the provinces where it is grown. In other provinces it is regarded more or less as an article of luxury.

Because rice is such an important article of diet, every care must be taken that it does not lose its important components in the process of husking. Unpolished rice does not keep well for a long time. The embryo containing the fat gets rancid and the outer shell containing vitamins and mineral substances soon deteriorates. So it is best to use freshly prepared rice. Paddy is bulky and costlier to transport, so it has to be made into rice for long distance transport. The time between transport and necessary storage and consumption is considerable. Long storage spoils rice. So the traders had to find a way out of the difficulty. It was found that if the embryo were removed and if the outer shell containing the vitamins and mineral salts were removed then it would be kept for any period without deterioration. Again polished rice has a better and more inviting appearance. Export trade gave an impetus to this

RICE UNPOLISHED AND POLISHED

tendency and rice polished in mills is getting common every day Polished rice is worthless as an article of food, in as much as it loses all that is of value in it—the salts, vitamins and the rich embryo.

Care should therefore, be taken to keep all that is under the husk The more of the coating is removed, the less valuable it is as an article of food Rice is husked in two ways It is exposed to the sun and then the husk is removed. By the second process the grain is boiled and dried thereby it is easily separated from the husk so that more of the coating can be preserved In any case whether paddy is boiled or not, rice should have its embryo and the coating intact It must at the same time be remembered that unpolished rice contains fat which makes it rancid on keeping and the embryo also attracts insects Rice should be made with the whole of bran on it and consumed fresh

Unpolished rice has the following composition —

Water	13 1	per cent
Protein	7 8	„ „
Fat	8	„ „
Carbohydrate	70 5	„ „
Fibre	6 8	„
Mineral	1 0	„ „

Researches have revealed that in the process of boiling paddy preparatory to husking some of the vitamins enter deeper under the coating Subsequent husking then does less injury , for it does not remove

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so much of the vitamins as would otherwise be removed.

Wheat.—Wheat is richer in mineral matters than rice. Whole rice contains only 1 per cent mineral matter ; wheat contains 2 per cent. Wheat has more proteins than rice. Thus wheat is superior as a food to rice. Like rice wheat must not be polished but ground whole into atta. Atta like unpolished rice does not keep long. For export purpose, therefore, the outer coating is polished off and the white grains are then ground into flour. Portion of the grain that cannot be ground fine and is coarser, is suji. Suji contains vitamin B, proteins and mineral salts of which the flour becomes devoid.

Whole wheat has the following composition :—

Water	13·4
Protein	13·6
Fat	1·9
Carbohydrate	69·1
Mineral matter	2·0
Vitamins A, B and E	

Whole wheat is very rich in vitamin B. Therefore in cases of vitamin B deficiency whole wheat may be boiled and the extract given as a drink to patients. Vitamin B deficiency brings in a distaste for food. It is therefore, not possible to introduce much vitamin in the system through whole wheat or whole rice (unmilled) as food. But an extract of it

RICE AND WHEAT A COMPARISON

containing as it does all the water soluble vitamins and mineral matters, is a rich drink for patients. Polished wheat or white flour is very inferior as an article of food.

A comparative analysis of rice and wheat —It will show that between unpolished rice and unpolished wheat the latter is in every way a better food from chemical point of view. Milled rice is more often used than white flour. The general practice is in favour of using atta which contains the outer coating. Therefore the comparison really lies so far as India is concerned between atta and polished rice, one of which is an excellent food and the other is an inferior food. Rice is boiled with some excess of water and the gruel or excess water from boiled rice which contains the remnant of mineral salts and vitamin B if there be any at all after the polishing it undergoes, is thrown away. No wonder therefore, that rice so prepared and cooked is condemned as bad by nutritionists. Rice is used practically along the east coast of India, from Assam to Madras Bengalees and Madrasis, according to those who can speak with authority, suffer from malnutrition the most. Use of rice rendered valueless by the polishing it receives, is principally accountable for this.

McCaruson says that the food of the Sikhs is satisfactory. It consists of atta, dal, milk, ghee, butter milk and vegetables. But in rice-growing and poor areas few can have such a food. Where rice is grown rice will continue to be the staple food so long

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as we do not find some cereal adaptable to the soil, equal in price and superior in nutritive value Till then millions will depend on rice We cannot convert the paddy fields into wheat fields but we can conserve to rice what belongs to rice If the useless waste of the vital substance of rice is prevented by keeping the bran coating on the rice and if the water in which rice is boiled be not separated or thrown away in the process of cooking, then rice is not a deficient food as compared with atta. On the contrary, there are warm advocates of rice amongst nutritionists who consider it to be a much superior food compared to atta Certainly more of rice proteins is absorbed than those of atta

Polished rice tastes better Rice cooked in excess of water does not tend to lump and looks better Thus to satisfy taste we impoverish rice Taste is no unerring guide in the choice of food. It will do us good to remember that men have fixed upon their foods not by taste but by experimentation as to what is best for the system Today we have the science of nutrition to guide us in our choice This science is still undeveloped. Only the fringe of it has been touched But what we have found out is enough to put us on the right track.

In India we have been more and more taking to polished rice in preference to the unpolished rice Introduction of rice mills has hastened the pace General poverty has increased and the ignorant impoverishment of this staple food grain of millions

BARLEY BAJRI OR MILLET

by polishing is responsible for many of our physical ills and deterioration Birth rate has increased no doubt But that by itself is no index of health Our death rate is very high Our physique is very poor Our vitality is low and power of resistance is decreasing We are helpless though with a little care and modification of taste we can have from rice what we need

Barley —Barley is particularly rich in mineral matters In this respect it is richer than wheat but its protein content is lower than that of wheat In fact its content of gluten is so low that it is difficult to be made into bread

Pearl barley is the whole barley, the outer coating of which is removed and polished off. Patent barley is similar to white flour Barley water given to patients has very little nutritive value Robinson's Patent Barley has the following composition — (Hutchison "Food", p 227)

Moisture	10	10	per cent
Protein	5	13	"
Fat	0	97	"
Carbohydrates	81	87	"
Mineral salt	...	1	93

This barley water as made for the sick, practically contains a little carbohydrate with much water and its value lies in its demulcent properties

Bajri, Ragi or Millet —It is very much like wheat in composition Its protein is not so good as that of

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wheat. It has however, this advantage over wheat that besides being cheaper it is richer in vitamin A. Its husk being thin, the whole cereal, husk and grain is ground and eaten. Vitamins A and B are thus available. The quality of bajri like that of many other cereals depends upon the character of the soil. Grown in poor, neglected or insufficiently manured soil, bajri is poor in nutritive quality. With reference to bajri McCarrison observes (Food, p. 78) :

"Good ragi (or bajri), either alone or with rice, when eaten with a sufficient quantity of milk and milk-products or fish and green leafy vegetables and fruits, is one of the best diets used by Indian races "

To this may be compared his observation on wheat "The best of all the diets used by Indian races is one composed of whole wheat flour (atta) or of home-pounded rice and atta in equal parts, milk products, dal, fruits and green leafy vegetables with flesh meat two or three times a month. No diet eaten by man is capable of producing greater physical perfection, strength and vigour than this".

In connection with the above observation of McCarrison one must remember what has been said of meat and vegetarian food previously.

Maize or Indian corn (makai) :—It is a cheap cereal but is not used as a staple article of food in India. Its protein is deficient in one particular and it lacks vitamin B. It is on account of these deficiencies that in areas where maize is used

MAIZE · DALS · SPROUTED PULSES

as a staple food, Pellagra appears Where therefore maize is to be used as the staple article of food, its deficiency should be corrected by proper mixture with dals and leafy food and milk products The yellow variety is richer in vitamin A

Dals —Dals or pulses and beans are of the same composition. They generally contain 20 to 22% proteins In other words, they are twice as rich in protein as wheat and have as much protein as meat Pulse proteins are superior to wheat proteins but inferior to meat proteins

Dal is best taken boiled with water By frying we lose the vitamins and make it less digestible Dal does not soften when boiled in hard water containing lime etc Soft water must therefore, be used or hard water made soft for the purpose Water may be softened by adding of a little soda bicarbonate or of washing soda But much of it will destroy the vitamins in the dal The use of soda bicarbonate or of washing soda should if possible be avoided Mere boiling with water very often softens it As the dals are rich in vitamin B for rice eaters dal is a very necessary adjunct The daily ration of 4 ounces of dal to 16 or 20 ounces of rice or 1 4 or 5 is a fair proportion

Mung is one of the best dals that we have Mung can be taken whole The custom is to remove the skin of mung By husking we lose the superficial coating and with it vitamins and salts A better way is to use it whole The skin is so thin that it can

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be eaten quite conveniently. The whole dal tastes better than the husked and split dal.

A still better way to use mung is to sprout it and eat the raw sprouted pulse. There are vitamins A and C in sprouted pulse. Some starch is converted into malt which helps the digestion of food. Sprouted mung is in every way a better article of food than ordinary dals cooked in water. But it is difficult to digest raw.

The whole mung boiled in water in the usual fashion is used by many. The sprouted mung is occasionally used. But by cultivating the habit of taking dal in its sprouted form we make for a superior diet at no extra cost.

Milk :—Milk is very nearly a complete food. It has long been known that it is deficient in iron. It has been recently found that it is deficient in copper also. Its iron deficiency does not matter to babies, for the mother stores enough iron in the baby before delivery, to last till it takes to other foods. Young rats exclusively fed on fresh milk shows growth at first but then there is decided retardation. They do not reproduce. Though milk is not absolutely a complete food, yet it is the one food for which it is hard to find an effective substitute.

"Its value is as a supplement for other foods to correct their deficiencies. Most animal and vegetable foods are singly or collectively faulty in sufficient degree to interfere with the physical development of the young and to lead to the early deterioration of

MILK AND MILK PRODUCTS DAHI

the adult A most important consideration to be kept in mind is, therefore, the selection of food so as to compensate for the deficiencies of one article by those of another and thus make a properly balanced dietary. For this purpose milk is the ideal food Milk and the leafy vegetables are the only foods so constituted as to make good the deficiencies of cereal grains, legume seeds, tubers, roots, muscles and meats" (McCollum)

Just because of this McCollum has called leafy vegetables and milk as protective foods But vegetables have more limitations than milk Milk therefore should be introduced into the diet wherever possible , at the same time the place of leaf as a food second to milk should not be forgotten

Milk contains very roughly speaking $3\frac{1}{2}\%$ protein, $\frac{4}{5}\%$ fat and 5% carbohydrate in the form of milk sugar The proteins and fats of milk are most assimilable They are almost wholly digested and absorbed The proteins are of the right kind for building body, they are complete proteins

Milk contains vitamins A, B and C Vitamin C is lost by heating Milk therefore should be taken raw if it be clean and safe Generally there is a risk of contamination at the time of and after milking Therefore it would be safer ordinarily to boil milk for use

One of the best forms of using milk is by making it into curd A particular kind of bacilli converts the milk into *dahi* and turns it sour But these bacilli

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prevent the growth of other injurious bacilli Milk can be preserved longer by being converted into dahi than otherwise

By churning milk or dahi the fat is separated out as cream of butter and the creamy butter is beaten into pure butter. Butter contains 90% of the vitamin A of milk The butter milk retains the other 10% of the vitamin A besides the other two vitamins and proteins and sugar It is therefore, an important article of diet being nearly as valuable as milk.

From the milk from which fat has been extracted, proteins can be separated by precipitation with lemon juice or alum solution The precipitate is called *chhana* It is milk protein The water left over after extraction of fat and proteins, contains milk sugar and vitamin B.

If lemon juice or alum solution is added to whole milk then the whole of fat and proteins are thrown off as precipitate and the watery liquid contains milk sugar and 10% vitamin A and all the vitamin B This water is a very valuable diet in illness It supplies vitamins A and B and therefore enables the patient to withstand starvation for a long time The little milk sugar which it contains is not likely to create any disturbance in the digestive system In typhoid fever in which the digestive organs are disorganised by attack of offending bacilli, it is often not advisable to give food to the patients In such cases the above water or whey with advantage may be given It allows the patient to struggle on without offending

IMPORTANCE OF MILK

the digestive organs and giving them the rest they need Curd or dahi beaten and thinned down with water is a good diet for the sick It is easier to digest than milk and where milk disagrees or sets up fermentation dahi is found to be tolerable

Many virtues are claimed for dahi People accustomed to take dahi are stated to be long-lived and free from diseases and stately in built

Indian confectioners consume a large proportion of the milk produced in the country They convert the milk into chhana throwing away the watery liquid though it contains almost all the sugar of milk and vitamins A and B The chhana divested of the sugar of milk, vitamins A, B has to pass through further prolonged boiling in syrup or roasted in ghee thus losing all its vitamins and the nutritional values It is almost criminal that so much waste of nutritional materials is allowed to go unchecked in this time of economic distress

The peculiar value of milk (in any form) has been acknowledged by experts from abundant proofs on experimenting with animals McCollum experimented on the comparative value of milk on a group of children in an orphanage These children of ages varying from 4 to 10 years lived in sanitary condition and had adequate food except that it lacked in milk and green vegetables So remarkable was the absence of green vegetables, that they developed scurvy It was found on enquiry that they got lemons as gifts from neighbouring fruit-growers, which were their sources of

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vitamin C. The diet usually served in the institution left little to be desired so far as calories or proteins were concerned. Examination however, revealed that malnutrition of a severe grade was widespread among them.

"The simplest procedure for improving of this diet without involving additional cookery, appeared to be the addition of milk One group of 42 children received one quart of whole milk each per day during the demonstration period

"The boys were divided into two groups of 42 each One group receiving the usual diet and the other group the additional milk In the first six weeks of observation both the groups showed increase in body weight. This is explained by the fact that before the experiments were begun the children were not receiving the quantity of food scheduled. Their food was not only deficient in quality but in quantity also But in the group kept on old diet, the sharp increase of weight of 2 to 5 lbs was not continued The weight of this group suddenly flattened and in practically all cases remained nearly or quite stationary

"The milk-fed group stood in marked contrast with the check group in several respects The sharp rise in body weight which was observed in both groups during the first few weeks was continued in most children throughout the demonstration, which for a considerable number covered a period of 21 months Several increased 50 per cent or more in weight during the first year. When milk was added

MILK ADULTERATION DEFICIENCY

to the batch kept on old diet, they then began to show similar results and again on being deprived of milk showed absence of increase of weight

"There was a marked change in the behaviour of the milk-fed group as contrasted with the check group. The latter were apathetic and very tolerable. The discipline of the institution was strict and these children were all obedient. Those in the milk-fed group on the other hand, soon caused annoyance to their teachers by their restlessness and desire for activity and were frequently guilty of infractions of the rules."

"All things considered, the results of this demonstration constituted, we believe, a demonstration of the validity of the view that a dietary selected from cereals, tubers, fleshy roots and meat does not prove satisfactory for the physical development of young children. It shows further that milk is an effective supplementary food for such a type of diet. This has been repeatedly shown to be the case with animals."

McCarrison writes, "The greatest nutritional need of India at the present time is the production of more and of purer milk, for there is no more important foodstuff than this and none on which the public health is more dependent. The conditions under which milk is produced and sold in India are often filthy in the extreme, its adulteration with impure water is a universal practice, the cream is commonly removed to make butter and ghee before the milk is sold, so that milk available to the people is not only

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skimmed milk but adulterated and dirty skimmed milk ; no proper attention is paid to the feeding of the cows and buffaloes nor to their hygiene and in consequence the milk and the butter or ghee obtained from it, are often of the poorest quality and lacking in proper content of the essential vitamins ”

“If the food contains enough milk and milk products then it is not necessary to eat flesh-meat at all ‘Enough’ milk is not less than one pint a day and a quart if possible ; but few children in India consume anything like this amount.”

Milk or butter containing vitamin A protects people using it from infectious diseases and the children from xerophthalmia or keratomalacia (eye disease due to vitamin A deficiency). How the use of milk and butter affects a whole race is well illustrated from what happened in Denmark. In Denmark the consumption of milk fat to the end of 1916 steadily declined. Butter was exported The decline of use of butter reached its very lowest level in 1916 and the number of cases of xerophthalmia reached its maximum. Then the exportation of butter was prohibited Xerophthalmia disappeared almost completely but reappeared in 1920 when butter was again exported.

Nuts :—Nuts are rich in protein and fat. They contain only a little carbohydrate. They are rich in vitamin B but have a poor supply of vitamins A and C. The proteins of the nuts are superior to those of cereals and dals They are sometimes difficult to digest, this is because of their compact nature.

NUTS . COCOANUT WATER FRUITS

When properly masticated and taken along with other foods, they can be digested well. They should therefore, be eaten with other foods properly chewed. The fat gives a high caloric value to nuts. Cocoanut may be called the king of nuts. Cocoanut tree is the very life of the Malabaris. The leaves go towards the making of huts, the sticks are used as broom sticks, fibres go to the making of ropes and mats, the shell yields rich fuel and the fruit is almost a staple food. Water from green cocoanut is a refreshing drink. Cocoanut water contains some mineral salts and a little sugar. But its real value lies in its richness in vitamins. When sick persons are to be kept long on starvation diet, cocoanut water is a great help. The water soothes and in many cases alleviates distressing nausea and vomiting.

Dry cocoanut contains nearly 50 per cent of oil and about 25 per cent of carbohydrate. One ounce of cocoanut yields 167 calories. Ground nut however, is richer than cocoanut in its protein content although inferior in oil content. Ground nut gives 155 calories per ounce. Ground nut cake on account of its high content of protein is a superior article of food but should be consumed soon after the oil is pressed out.

Fruits —Fruits supply vitamin C, mineral salts and roughage. They serve to some extent the purpose of leafy vegetables but are inferior to them. They contain alkaline matter which helps to keep the blood pure and free from acidity. On account of the roughage content of fruits they keep the bowels clean. Where

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fruits are cheap they are very useful adjuncts to food. The non-sweet fruits add but little to the energy value of food. Tomato may be called a fruit or a vegetable. It is an ideal article of diet. It is cheap and is rich in its contents of vitamins A, B and C Sweet fruits like dates are full of sugar and contribute very greatly to the caloric value With the Arabs dates are staple articles of food. Bananas contain much starch and sugar. They contain very little vitamins but are useful foods

Fruits and nuts may be chosen to constitute the entire meal. Fruits are very costly. So they cannot become the principal articles of diet till they become cheaper. Where they can be grown cheap, they of course come in the first rank, provided the proper combination of protein, fat and carbohydrates is secured within the bulk consumed. Fruits may be put in two classes . flavour fruits and food fruits. Dried fruits like raisins, dates, dried bananas are food fruits like nuts Oranges are both flavour and food fruits for in addition to the flavour and mineral content, the sugar content of oranges gives them unique value Oranges are particularly rich in calcium and vitamins A, B and C

Mangoes can be eaten as staple food. Where they are cheap, quite a number of people live in the season on mangoes and jack fruits. Jack fruits are however, difficult to digest. Sour fruits like lemons have a great value in dietary. It is advisable to finish a meal with lime. The acid juice cleans the mouth and

LEAFY VEGETABLES

preserves teeth from decay. Tamarind is cheaper than lemons but is nevertheless a prized article of food. The sugar content of tamarind is considerable. It is rich in mineral salts and is a source of vitamin C. It can be easily preserved as a dry fruit if the seeds are taken out. Tamarind grows in abundance without care. The trees are great suckers of nutrition from soil not only in the immediate neighbourhood but also from some distance.

Leafy Vegetables.—The virtues of leafy vegetables have been too highly extolled previously to need repetition. They contain all the mineral elements, particular leaves being specially rich in some mineral matters. Leaves may be regarded as poor man's milk. Of the edible varieties those that can be eaten raw should be so taken. Succulent leaves should be chosen for raw use. Leaves exposed to sun and air develop full leafy quality, therefore the outer leaves of cabbages are superior to the inner pale leaves.

Neem leaves stand by themselves as a raw food material. It is one of those leaves which on chewing almost melts in the mouth leaving a slight mass of cellular tissue. It is believed to possess many useful functions as a protective food. Ordinary succulent leaves if cut to fine pieces and treated with salt and lemon or tamarind are very nearly like cooked *bhaji*.

People in many provinces chew betel leaves. This is one form of taking green leaves and much has to be said for it. The usual practice is to paint a little *chunam* on the *Pan* to take off the sharpness or

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pungency of the leaves. Then a little *katha* or catechu is added and some betel nuts. The nuts give the mass better chewing quality. The teeth get strong and healthy for this exercise. But the addition of *katha* (*khadir*) has decorative value In contact with lime *katha* becomes red and tinges the tongue, lips and teeth red. But really it does not decorate It rather takes away the natural healthy gloss of lips and the interior of the mouth. Apart from this, the tanning action of *katha* renders the tongue and the cavity of the mouth insensitive. The tongue is one of the most sensitive organs. To make it insensitive is bad for health Chewing of betel (pan) leaves is healthful but it must be minus *katha*

By developing the habit of eating green succulent leaves in quantity with our meals, we may to a certain extent do away with need of taking milk. The quantity to be taken will depend upon the digestive capacity of the individual. Too much should not be attempted at once Some ghee or oil and spices may be added to the leaves to taste

Roots and Tubers :—Vegetables such as brinjal, bhindi (*dhenros*), potato, lonka, pumpkin, kumra, beet, carrot, khokhol, turnip, cabbages, sweet potatoes, onion, garlic, cucumber, melon and radishes are commonly used throughout India. Some of these are fuel foods containing starch. Some tubers and roots fall in this class Others are of the fruit type yielding vitamins and mineral salts but little fuel.

ROOTS AND TUBERS OILS

These contain proteins but not of a high order. As for vitamins, vitamin A is rarely found in them. Some contain vitamin B and all have vitamin C which is practically destroyed on cooking. Yellow colour is associated with the presence of vitamin A. Therefore yellow or yellowish tubers and roots should be sought for, for vitamin A. These supply the necessary roughage and are valuable that way also.

Some of these have distinct antiseptic properties. Onion and garlic are most valuable for antiseptic properties besides their content of B and C vitamins.

Oils — Oil supplies energy in a concentrated form. Each gram of this substance gives 9 calories or an ounce 250 calories whereas an ounce of atta or rice gives only 100 calories. Oils do not contain vitamin A which is found in animal fats or milk. When vitamin A is supplied from milk or fishes or leaves then ghee may be replaced by oils for the supply of food requirements to a considerable extent.

Til, linseed, ground nut, mustard and cocoanut oils are used for culinary purposes and taste. Mustard oil is very good for rubbing on the skin to keep it supple, antiseptic and free from infection. Cocoanut oil and til oil are bland demulcent oils so also ground nut oil. They are good for cooking purposes. Cocoanut oil becomes rancid soon.

Besides oils, seeds or tubers yielding oils are used as food. Til seeds, poppy seeds or ground nuts are examples. Instead of using the oils, wherever

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convenient the whole seeds may profitably be used. The use of oil cake is recommended as valuable food. The cakes contain protein, some vitamins and mineral matters of which the oils are devoid. Instead of taking oil and oil cake separately, it is better to take the whole seed.

There are more growth-promoting and protecting articles in our raw food materials than can be isolated. But with the progress of science of nutrition, more and more light is being thrown and the plain fact is becoming more and more evident that the more we artificially refine, separate or cook our food materials, the more we take away from them their value. All foods cannot be taken raw but those that can be taken raw should be so taken. Mustard oil is irritating and is good for massage. It gives flavour to food and is prized for that.

Condiments :—Chillies, coriander, zeera, mustard, cloves, ginger, cardamoms, cinnamon etc. contain flavouring materials in the form of essential oils. Condiments are not food but make food appetising to the taste. Taste is a cultivated thing and the tongue may be trained to like condimentless plain food in preference to condimented or spiced food.

These spices and condiments are sometimes so irritating that they create blisters. Mustard plaster is used for blistering. Yet this article is daily used by thousands of persons. The stomach gets like being blistered but strains itself to carry on its function in spite of the ill treatment. Chillies are also quite

CONDIMENTS MEAT AND FISH SOYA BEAN

irritating There is one thing good about chillies
Green chillies contain some vitamins

Meat and Fish.—Meat and fish contain good proteins and vitamin A They do not contain vitamin B and therefore the more meat or fish is eaten the more necessity is there of getting plenty of vitamin B from other sources. When meat or fish is taken the whole animal should be preferred The kidneys, liver, brain and the glands are valuable articles of food as has been mentioned elsewhere They contain the life-giving materials which are not in the muscle meat Fish oils and fish liver oils are very good sources of vitamins A and B Eggs also fall in this class Eggs are rich in vitamins, fats, proteins, calcium, phosphorus and iron. Meat, fish and eggs are all acid-forming foods and induce acidosis which is the opposite of health When these are eaten, plenty of vegetables, cereals and leaves should be included in the diet Meat or fish or eggs need not be eaten at all by those who do not want to Every need of nutrition may be satisfied from cereals, legumes, vegetable leaves and milk

Soya Bean —It has been shown (J H Prentic, A G. Baskett and G S. Robertson) that soya beans plus mineral mixture bring about the beneficial action of growth, maturity and egg production of chickens almost to the same extent as milk

The soya bean is rich in valuable nutritive ingredients, viz, proteins and fats Starch is

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practically absent. It is also rich in mineral matter especially soluble phosphates and potash.

The biological value of the soya bean protein is very rich. It contains almost all the important amino acids, particularly glycine, tryptophane and lysine. In fact the protein of the soya bean is very similar to that of cow's milk and of animal muscles. Soya bean contains lecithin more than any other plants and therefore could be used in nervous diseases. The lecithin of soya bean according to Dr. J. Freud, is identical with that of egg yolk. Soya bean contains vitamins A, B and D. Soya bean is extensively grown in China and used extensively in China, Japan and other parts of the world. The young pods are used as green vegetables; seeds are used as vegetables. Sometimes they are allowed to sprout and sprouted grains make an excellent vegetable of high nutritive value and contain vitamin C also.

As a source of human nutrition, if introduced specially amongst vegetarians in India, the soya bean is likely to form an important item of diet. It can be used in the same way as other pulses and various other preparations. Soya bean may be singled out and regarded as the best pulse so far known. The large yellow mammoth variety is the best from the feeding point of view, possessing as it does, the greatest percentage of proteins.

The State Authorities of Baroda have taken up the introduction of soya bean cultivation in Baroda territories.

COMPOSITION OF SOYA BEAN

Comparative percentage composition of soya bean

	Soya Bean	Milk	Wheat	Rice
Protein	42.0	3.5	12.2	8.0
Fat	20.0	4	1.7	2.0
Carbohydrate	24.0	5.25	73.7	77.0
Calories	2165	325	1750	1720

WATER IN NUTRITION

The human body contains a very large percentage of water. Water is essential to the composition of the body for the functioning of the different processes. Cells must be bathed constantly in fluid, the major part of which is water and food or nutrition is transported by water route through blood. Blood keeps 10 to 14 lbs of water continually in circulation. As water carries nutrition, similarly it washes away the waste products through elimination channels, viz., the skin, the kidneys, the lungs and bowels.

We take water when we feel thirsty. But apart from what we take directly as drink, we take large quantity of it indirectly through our food. The following is a list showing the percentage of water in food materials and calories per 100 grams of substance (from McLester, Nutrition and Diet, 1927 p. 102) :—

Food	Water per cent	Calories per 100 grams
Cucumbers	95	9
Lettuce	94	5
Celery	94	9
Tomatoes	94	23
Whey	93	27
Melon	92	30

PERCENTAGE OF WATER IN FOODS

Food	Water per cent	Calories per 100 grams
Radish	92	15
Onion (boiled)	91	42
Butter milk	91	37
Spinach (cooked)	90	22
Beet greens (cooked)	90	26
Peaches	90	42
Pineapple	89	44
Milk	87	71
Oranges	87	53
Egg whites	86	18
Apple	84	65
Potato (boiled)	75	89
Banana	75	101
Rice (boiled)	72	112

It will appear from the above that our common vegetables contain as much water as milk and sometimes more. While 100 grams of milk has only 87 parts of water, melon, tomato, and radish have about 90 parts of water. If we press these fruits or vegetables they show their watery character.

Besides the water we take in through drink and food, the system itself generates water by the combustion going on in the system.

The rate at which we take water, we must eliminate also in order to maintain the balance in the system. Water content of the body suffers a considerable fluctuation. Running or violent exercise causes a

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great loss by perspiration and through the lungs. This has to be recouped by drink or food.

Any great variation in the normal quantity of water in the body interferes with the vital processes and causes acute distress. Death may occur within 3 days of abstention of water. Loss of water takes place, no matter whether we drink or not. So if we do not drink or take sufficient water, blood gets thick and necessarily the kidneys fail to deal with thick blood efficiently. And as a result poisons accumulate in blood and cause death. Unconsciously persons form a habit of living on less than optimum quantity of water. The result is ill health as shown by headache, nervousness, loss of appetite, digestive disturbance and inability of concentration in work. On taking proper quantity of water these symptoms rapidly disappear. The introduction of water into the stomach facilitates the flow of gastric juice from gastric glands and improves digestion. Dilution of food material by water facilitates its absorption. Only care need be taken that during meals the food is not washed down the throat by water instead of its being chewed.

Water exercises a regulatory influence on the temperature of the body. Heat is dissipated from the body through the skin by way of perspiration. One-fourth of the calories is thrown off through the lungs and perspiration. In hot weather the amount lost through perspiration is enormous, while in cold weather elimination is primarily effected through the kidneys in the form of urine.

OPTIMUM QUANTITY OF WATER BATHS

For keeping good health an adult should take 6 glasses (1 lb measure) of water daily in addition to water taken in the form of food. This quantity is then enough to flush the body and meet all internal needs.

We have seen that invisible perspiration carries noxious substances with it and while the water evaporates, the poisonous substances remain on the surface of the skin, sometimes on the pores themselves. For health these have to be removed by washing off during bath. A bath is very necessary not only to wash off the poisonous matter from the skin but also for keeping the skin otherwise in a healthy condition. Cold water or water at body temperature should be used for bathing. The application of cold water followed by friction causes rush of blood to the skin. This gives the skin its necessary exercise and the rushing in of blood keeps the skin healthy and capable of normal functioning for the rest of the day.

Massage serves to quicken the circulation in the skin and helps the skin to maintain health. Massage followed by bath is greatly conducive to the health of the sick or sickly persons. A cold bath leaves the pores of the skin contracted and makes the blood circulate rapidly. So there is very little chance of catching cold after a cold bath. A warm bath dilates the pores and there is consequently the risk from exposure to cold. Properly regulated bath once, twice or even thrice a day can be conducive to health and never harmful.

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Any water however is not good. Water used for drinking, cooking and bathing should be water free from bacteria and also from dissolved mineral impurities and suspended matters.

Turbid water may be changed into good clear drinking water by separating and settling impurities with a little alum. Most of the solid impurities and along with them much of the bacteria are brought down with the precipitate. The clear water must needs be further treated. If the water is from open sources like rivers or large over-flooded tanks, then there is always the risk of its being contaminated by bacteria of diseases like dysentery, typhoid, cholera etc. In such a case water should be rendered harmless by boiling.

Constant use of hard water for drinking may cause stomach trouble. In such case the hardness should be tested and removed by boiling and an addition of a little soda carbonate to precipitate calcium and magnesium. Plentiful use of water for cleaning the body, the utensils and household has always diminished and checked ravages of disease. Water supply should not only be pure in quality but should also be plenty in quantity, or in the alternative people must be taught to cultivate the habit of keeping clean and healthy with the minimum use of water.

SUN'S RAYS IN NUTRITION

The sun is a great nutritional factor Sunlight is an essential factor for maintaining health Dark places where sunlight does not penetrate, breed tuberculosis, rickets etc It is not the warmth or heat of the sun but the light itself that acts beneficially on the skin The skin as we have seen is an important organ In addition to the function of covering the body and of eliminating excretal matter, the skin serves the purpose of absorbing light for the system Sun's rays on coming in contact with the skin affect it on the surface and then the rays get filtered down through the skin to layers beneath, bringing about many changes helpful to the growth and well-being of the individual The skin in fact is the natural cloth of the body, an admirable organ growing continuously throughout life, having sensory nerves distributed throughout It regulates temperature, allows excretory sweat to pass off and readily absorbs sunlight Properly aired, watered and lighted, the skin becomes velvety, soft and shows the pigmentation and glow of health If plenty of light is properly directed on the skin that itself induces continuous circulation which is the object of massage Light causes pigmentation on the skin which still further increases the capacity of absorption of

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ultra-violet rays of the sun. The curative and health-giving action of light is great. Injurious bacilli on the skin are rendered innocuous by sunlight. But processes vastly more subtle than this also take place. Although sunlight cannot manufacture vitamin A by its action on the skin, yet it induces changes by which the least amount of vitamin will serve to maintain growth and health. It has been proved that sunlight induces the production of vitamins D and E by its action on the skin. We have not yet fully known many other good things that follow from the absorption of sunlight by the skin. But sure it is that limited exposure to sunlight brings joy, hope and health.

The action of sun on the skin is due to light rays and not heat. Therefore cold rays of the sun should be availed of as far as possible and the hot may be avoided. To the unaccustomed, exposure to heat of the sun may act injuriously. The best time therefore for having exposure to sun is the morning and for the whole day for the diffused light to work upon. Although sunlight is good, yet we need the darkness of night as well for health. Too much exposure to sun should be avoided. It must be borne in mind that we cannot have health and nutrition without the appropriate dose of sunlight given to our skin.

Clothing protects the skin from exposure to changes of heat and cold but clothing also shuts the sun's rays from the skin. Attempts should be made to use as little clothing as possible from the point of view

SUN'S RAYS ON THE SKIN . CLOTHING

of hygiene. The idea of decency associated with covering should be kept within limits and the body should be allowed to receive the share of sunlight it needs Loose clothing of white fabrics is preferable for permeating sun's rays

EXERCISE AND SLEEP

Exercise

We have learnt much on technical matter about nutrition in the previous pages. Our objective however, is not nutrition but health. Nutrition is necessary for health. In order to develop and maintain the body in efficient condition nutritious food is necessary but exercise is no less necessary. Without exercise there will be no health. The whole system will refuse to operate. The stomach will refuse to digest properly, the intestines will refuse to deal properly with the materials delivered to them in an unsuitable condition and blood will be loaded with poisonous matter.

Nature has built the human body intending it to work and to be maintained by work. This point becomes strikingly evident when we look at a child, a tiny dot, awake and in its bed. The child cries without purpose and it moves its hands and feet all the waking time without purpose. It sleeps long periods, but in the intervals when it is awake, it is intensely active. The seemingly purposeless movement of the child is with a purpose. Nature wants the child to exercise that it may digest its food and throw away waste products and thereby grow. The child exercises in response to that urge. Later when the child is a

NEW BORN CHILD STUDENTS GROWN-UP PEOPLE

boy, he runs about and jumps without need or without purpose We can read nature's urge in these movements What is true of childhood is true of all subsequent periods of life The muscles of the body must be moved in exercise in order to keep them repaired and in health Those who have yet to grow, can grow by this method

Poor people need little lesson on the benefits of exercise They have to do manual work for their living It is the richer people and people whose profession does not involve physical exercise, suffer from want of exercise The student population falls under the latter category now It was not so always At one time pupils had to do manual work for their teachers Teaching was more by contact than from books and the contact was partly through physical work

The needed exercise has to be put in Those whose profession involves physical exercise of one kind or another are safe But those whose occupation does not involve physical exercise, are apt to neglect this matter Many exercises have been invented for this class of men—students, lawyers, doctors, clerks etc But the exercises do not give them joy—the joy that the child feels in moving its limbs aimlessly People automatically find joy in physical work when it is within proper bounds If standard forms of exercise could give that joy then that would be all right. But these exercises lack one particular Some monotonous movements are performed but nothing

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is created or altered, destroyed or moved outside him by the exercise. The exercises would be more enjoyable if their character could be altered. Productive work gives joy. Some works involving physical labour may be hit upon by persons of sedentary occupation to exercise their bodies. Cleaning and washing of clothes involve labour and if time could be found at the hour of bathing, cleaning of clothes would go some way towards meeting the need. Walking is a good form of exercise for this class of men if they would walk. But there is no time generally for these. Real thing is that there is no desire. Mr Sanford Bennett who became a young man at seventytwo writes, —

“Too much trouble”—that is the objection of a lazy person. If, by the same exertions for one year, you could be assured that you would receive 50,000 dollars, you would not think that too much trouble, but would esteem it to be the opportunity of your life. Yet the health and improved physical condition which would surely result from one year’s systematic and persistent practice of the methods (of exercise) could not be purchased for that or any other sum. There is no royal road to health. It cannot be bought; if you would possess it you must work for it. But the way is easy, the work is not hard.”

Poor people often have too much of exercise. Yet the tendency to be lazy is amongst them, as in all other classes. Society has put a false value on the merits of being freed from the necessity of physical

NEWER VALUES TO MANUAL LABOUR . RELAXATION

labour and hence the evil has rooted deep into the society. Newer values to labour and to exercise have to be given. The new born baby, nature's unsophisticated creation, may give us lessons which are beyond all arguments Even the infant has to work in order to build up its health. He does it instinctively Let grown-up men do it purposely

Relaxation and Sleep

Exercise is necessary for health But relaxation is equally necessary Complete relaxation is obtained in sleep Health is secured by alternating exercise with relaxation It is then alone that the tissues constituting the human body get chance of utilising the blood fully, absorbing nutrition, growing, repairing and throwing off the waste material

The new born child sleeps and sleeps With age its period of sleep lessens For the first few days the child keeps itself awake only 2 hours daily. At the age of seven the child keeps awake 12 hours and sleeps 12 hours Thence forward the time of sleep gradually diminishes, till at maturity a man needs seven to eight hours of sleep Dreamy or disturbed sleep does not give full relaxation and in spite of the sleep the man will feel tired and exhausted when waking Sleep need not be counted by hours If we had an instrument we could measure it by relaxation Relaxation of the tissues may be achieved while one is awake and working All the parts of our body do not work at

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the same time. Only some tissues are called into play at any particular kind of work. While some tissues are doing their duty, others need not stand attention uselessly. Others may be ordered off to take rest. When one set of machinery in the human system works, other sets may be enjoying relaxation or partial sleep. The quality of relaxation for the organs ordered off-duty would depend upon the mental poise of the individual. This happens in practice.

The fire-brigade men are practically continually on duty in their headquarters. This would ordinarily be supposed to be a great strain on them. To be ready dressed, to descend by a chute and drop into the car in 10 or 15 seconds of a fire call coming and the call may come any moment - this is the brigade men's life. It sounds like involving great strain on them. But if the men are in strain all the time they are waiting, when the actual call comes they will find themselves tired and exhausted in no time. But no, the fire-brigade men are trained to have a mental equipoise about the fire call. They talk, laugh, play or rest in the room, unconcerned. As soon as the call rings, to slip in the boot and dash down is two seconds' business. Alertness comes out of training as also the capacity of relaxation. A fire-brigade man dashing to the scene of action at the call arrives fresh and is able to put acute energetic service in fighting fire.

What a fire-brigade man does, every one can do with more or less success and allow sleep or relaxation

RELAXATION IN WORK . GANDHIJI

to the tissues not required for service at a particular moment Such a person may do with much less sleep In fact his organs have been sleeping by shift if he has a variety of occupations There is an urge from nature for a change of position or occupation when exhaustion has come When this is done, the exhausted organs rest The equipoise that brings relaxation to a set of organs while others are being exercised is not merely of body but is of body and mind A person whose body and mind are properly poised can do much more work than a person who does not know how to obtain relaxation during work When we are speaking, our abdomen and limbs need not be strained The brain dictates, the voice delivers the dictation Why should there be any strain on the limbs and other parts of the body ? But untrained body and mind suffer strain while the trained man in such a case gives rest to tissues not on duty Gandhiji is a living example of this He has so often been seen working day and night without stoppage and without sleep He will give the shortest time to personal needs in moments of pressure of important public duty He can perform work like a magician because his body and mind are trained for an equipoise unattainable by others He conserves energy by shunting off the organs and tissues not required at the moment to perform an exercise

A few minutes' relaxation sometimes serves as a great restorer When a man feels sleepy it should be concluded that his system wants rest If rest

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is allowed by way of sleep and the man has the capacity to sleep at call, he will find himself fresh or relieved of a good deal of exhaustion after only a few minutes' sleep. Sleep should be considered with relaxation and all the needed relaxation should be given to the body in order to bring out the best from it. A lazy person may not find argument for laziness in this. Laziness is quite different from relaxation.

FASTING FOR HEALTH

It has been pointed out in the beginning of the chapter on nutrition that diseased condition may be regarded as one 'without ease' It is the toxic condition of blood In order therefore to maintain health, such nutritive materials should be given to the system as blood of proper quality be formed In our search for a proper food and for health we have covered a lot of ground on nutrition But suppose, in spite of the effort, something goes wrong What is to be done? Something going wrong means attention must be paid to cleansing of the blood There is a time-honoured way of cleansing the blood It is by fasting It had many votaries in the past Religious fasts are as a rule in all the great religions of mankind. Saints fasted to attain peace which they lacked otherwise Ordinarily people fasted on some religious occasions Fasting gives decided spiritual benefit But the benefit of fasting is not merely spiritual, it is also physical Although the motive may have been religious, the physical effect is always there At the present day more and more men are coming to recognise the value of fast for spiritual purpose and also for purpose of health

During fast no food being given to the stomach, it enjoys rest Plenty of water is drunk and the process

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of elimination of toxins goes on vigorously. Extra flesh and fat are done away with, the skin performs its work of excretion undisturbed and without being called upon to work with fresh injurious material. The blood gets the right tone. Accumulated food in the colons finds occasion to be cleared out. In fact it is a house-cleaning operation. Some families and some societies have the custom of an annual house-cleaning. The debris are removed, the refuse matter collected and burnt or otherwise disposed. Yards, floors, rooms, lumber all are cleaned. The household staff—men, women and children are then all engaged in this life-giving operation of cleaning. Every thing else is shoved aside for the time. Cleaning becomes the primary objective of all activities. Exactly this sort of thing happens in the great body-cleaning operation of fasting. All the unnecessary materials are dislodged and thrown out or consumed in the hunger of blood for replenishment.

It is a wonderful fact about the economy of nature how the vital organs remain untouched. The organs improve. The skin becomes more reactive and the brain gets clearer. Passions soothe down and there is a general composure in a fast taken cheerfully, with a purpose. In a fast the cleaning is thorough. If there is accumulated dirt in colons we may wash it out and if there is waste matter under the skin, we may sweat it out but we cannot in this way reach all the organs and all tissues. In a fast waste is collected from all parts of the body, the largest bone

FASTING IN HEALTH AND DISEASE

must yield its share like the tiniest cell. Nothing is overlooked or omitted by nature in this process of cleansing.

This being so, a fast must be regarded as a great natural process of curing illness. When an animal gets ill, it refuses food. It does this naturally. When a man falls ill he would naturally have declined food. Sometimes a patient refuses food and the nurse, the doctor and relatives all get nervous and try to induce the patient to take food. It should be recognised that abstention from food for a number of days cannot kill a person. Abstention from food is necessary during illness. When however the patient gets the false call of hunger in disease, he should be given something to drink to soothe him, something having little food value. This should be the underlying principle of regulating diet in illness. In protracted illness, it is a problem how to maintain the resisting capacity of the patient, at the same time not to do him harm by introducing food which may further upset the system. When one is worried or is taxing his system for safety, he should cut off his food or fast. He will be better able to go through an ordeal then.

Now to return to fasting. When a fast is found necessary on grounds of health, the person undertaking the fast should regard himself as a patient and gradually do less and less work and when he feels weak he should take to bed. He must strive to pass the days and nights cheerfully without worry. In fact

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cheerfulness and joy are the secrets of success in a fast. A man tolerates a fast badly if he has a terror of it and is worried and borne down by anxiety as to what is going to happen to him in fast. Such a person may fast for a day or two and then break the fast accustoming himself to shed fear of fasting and at the same time striving to discover joy in it.

Fasting being undertaken as a cleansing process, plenty of water should be used internally and externally for the purpose. At least 6 pounds of water should be drunk daily. Water may taste insipid in fast. Addition of a little soda bicarb to water is helpful. Soda bicarb has a soothing effect and improves its taste. A little common salt may be used. One or two baths should be taken daily and the body should be properly massaged with oil and exposed to sun for a time. The intestinal oxidation process does not stop with the stoppage of food. It goes on and produces excreta. But there being no bulk, there is difficulty in their being thrown out. A lot of saline water acts as a purgative but in some, water may pass out as urine, leaving hard stools to stagnate. In fast the colons should be washed out daily even when the person may have more than one motion a day. The washing helps to eliminate poisons from the system very efficiently.

During the first two or three days, hunger may oppress the patient. After that the habit of taking food is lost and there is no hunger. Work should be done according to the nature of the resisting capacity of the

WATER, BATHS, MASSAGE IN FASTING NAUSEA

system Some may work on for 8 or 10 days and even more and some may like taking to bed on the first day The same person may exercise at one time and on another occasion may require rest from the very beginning of fast Massaging should not be forgotten Those who are weak and cannot exercise during a fast need massage the most for throwing off poisonous materials from the system.

A fast should be broken when there is nausea and one cannot get over it and water drunk is vomited out It is a positive sign that the cleansing process is disturbed and that the vomiting centre in the nervous system has been exposed to some toxic effect

It is difficult to break a fast than to go through it The breaking must be very gradual The patient should be given only some fruit juice on the first day In every other respect he should continue as if he has been continuing the fast On the second day some milk or thinned dahi may be taken along with fruit juice Milk or dahi and fruit juice diet should continue for three to four days, the routine for massage, baths and enema remaining undisturbed

On the fourth day some thin starchy food may be taken and thence forward the patient may gradually return to normal diet

I have some experience of fasting I have not taken fast longer than 15 days But at the end of fifteen days I felt like continuing it for a longer period. I have felt better in every way after a fast During

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one of these fasts I was engaged in strenuous work from which I could not possibly get leave I continued work taking only six hours' rest in sleep I had to walk 8 miles daily. On the ninth day I had to walk eleven miles. The fast terminated on the tenth. During the fast I took cocoanut water I wondered if cocoanut water contained something which kept up my energies so well. During the next fast for a definite period of 15 days, I began to take cocoanut water from the tenth day. Cocoanut water has little food value It contains naturally a little salt and a few grains of sugar. These few grains of sugar were negligible as food I was losing weight at the rate of one pound daily, but on the 12th day the weight remained constant Not only that, I gained a little weight, something like half a pound in the next three days. This, I attribute to the fact that cocoanut water reacted on the system so as to make it retain some water. During the last three days the skin was materially improving also in tone An expert on naturopathy examined me on the 10th day and again later and declared that he found no trace of fasting on me and that I was bearing the fast exceptionally well. I mention this so that the horror may disappear from those who might need a fast A fast should be undertaken cautiously and borne cheerfully to get the best results. During this 15 days' fast, I had less than normal sleep My system at this time being in a weak condition I did not dare take physical exercise as in the previous fasts and this

EXPERIENCES IN FASTING

may be the reason for wakefulness But it was in no way disturbing or exhausting.

I have supervised the fasts in several cases I had recommended fast in a case of slow fever which the physicians suspected to be tuberculosis Fasting for three days combined with sitting upto neck in water for several hours daily for a month cured the patient I got also remarkable instances of recoveries by regulating diet of patients veiging on keeping them on fast

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Approximate amounts (in grammes) of protein, carbohydrate and fat and calories yielded by one ounce of various foodstuffs. *

(One ounce is approximately $\frac{1}{2}$ chattach)

Foodstuff	Protein	Carbo-hydrate	Fat	Calories
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Cereal Products

Arrowroot	0·23	23. 6	..	95 3
Barley	3· 6	20 1	0. 6	100 6
Biscuit	4· 4	20· 8	0 4	104 0
Bread (Brown)	2· 7	13. 7	0·25	69 4
,, (White)	2· 6	14· 9	0 36	74· 9
Chira (Beaten rice)	2 6	21 1	0 03	95
Khai(Fried paddy)	1 9	20 7	0· 7	96· 7
Maize (Indian corn)	2· 8	18· 3	1· 9	95 8
Muri (Puffed rice)	2 1	19 4	0. 3	88 7
Oatmeal	3 6	17· 9	1· 6	100 4
Rice (average)	1·42	23 6	0 23	102 1
Sago	0 05	24· 9	...	102· 2
Sooji	4	13· 5	0 6	75· 8
Wheat				
(Whole meal, Ata)	3· 3	19	0· 8	96· 4
Wheat flour (Maida)	3· 1	19· 2	0 3	91· 9

Lentils

Chhola (Whole gram)	6· 2	16· 7	1 2	102· 4
Dal (average)	6· 7	15 9	0·65	96 25

Foodstuff	CONTENTS OF FOODSTUFF			Calories
	Protein	Carbo-hydrate	Fat	
<i>Vegetables</i>				
Binjal	0 2	0 9	0 4	
Green Vegetables (average)	0 25	1	0 4	8
Onion	0 35	2 5	Trace	
Patal	0 21	0 37	0 8	5
Potato	0 5	5 8	Trace	19 1
Radish (Moola)	0 0	1 6	0 1	3
Tomato	0 2	1	0 3	27
			0 1	9
<i>Milk Products</i>				
Butter	3	0	25 7	5 7
Chhana (Fresh milk curd)	6 3	0 1	5 3	232
Cream (Sal)	0 7	0 8	8 8	73
Dahi (Curd)	1 3	0 8	1	85
Ghee	0	0	24	17
Milk (Cow's puer)	1 1	1 3	1 2	223
" (human)	0 8	1 7	0 8	20
Whey	0 28	1 4	0 08	17
				7 6
<i>Oil</i>				
Mustard oil	0	0	28 22	
Fish				
h (average)	5	0	1	256 8
Meat				
en	5 8	0	1	31 8
	6 1	0	0 99	27
			0 7	31

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Foodstuff	Protein	Carbo-hydrate	Fat	Calories
Fowl	5.4	0	4.6	63.6
Goat's flesh	6.8	0	0.7	34.4
Mutton (lean)	4.5	0	4.5	60.3
<i>Eggs</i>				
Egg (Duck)	3.8	0	4.1	52.1
,, (Hen)	3.8	0	3.3	44.9
<i>Cooked Food</i>				
Boiled rice (Bhat)	1.4	11.8	0.28	56.7
Chapati	2.67	19.65	1.05	101.2
Loochi (Cooked in ghee)	2.1	14.2	6.4	126.3
<i>Soups</i>				
Pea soup	1.4	3.18	1.92	36.6
Raw meat juice	0.5	0	0	2.05
<i>Fruits</i>				
Apple	0.11	2.19	0	9.2
Bael	0.18	4.5	0.2	20.8
Bedana	0.29	2.2	Trace	9.6
Cocoanut (Kernel)	1.7	1.5	15.1	148.7
Dalim (Pomegranate)	0.18	0.19	Trace	9
Date (Khejur)	0.3	16.2	0.25	68
Grapes	0.16	6.8	0	27

CONTENTS OF FOODSTUFF

Foodstuff	Protein	Carbo-hydrate	Fat	Calories
Litchu	0.84	1.9	0.07	325
Mango (average ripe)	0.34	4.99	0.21	11
Orange	0.1	1.9	0.1	23.2
Peach	0.18	1.2	0	9
Pears (Naspatti)	0.1	2.34	0	5.5
Pineapple	0.17	2.1	Trace	10.7
Plantain	0.4	5	0	9
Sweets				22
Sandesh	5.16	11.4	5.6	120
Sugar	0	26.8	0	109.8

Caloric value of food constituents —

1 grain of protein = 4.1 calories

1 grain of carbohydrate = 4.1 calories

1 grain of fat = 9.3 calories

Vitamin Contents of Foods

Foodstuff	A	B	C.	D.	E
Almond	+ 1	+ 3	x		
Apple	+ 1	+ 2	+ 2		
Asparagus	+ 2	+ 4	+ 3		
Banana	+ 1	+ 1	+ 2		+ 2
Barley (whole)	+ 1	+ 3			
Beef	-	+ 2	?		+ 2
Brain	+ 2	+ 3	?	+	
Bread (white)	-	+ 1	-	-	
Brinjal	+ 2				
Butter	+ 5	-	-	+ 2	+ 2
Buttermilk (ghole)	+ 1	+ 2	+ v		
Cabbage (cooked for short time)	+ 2	+ 2	+ 1		
Cabbage (raw)	+ 4	+ 4	+ 5		
Carrot (cooked)	+ 3	+ 1	+ v		
Carrot (raw)	+ 5	+ 4	+ 2		
Cauliflower	+ 1	+ 2	+ 3		
Cheese	+ 3	+ 1	-		
Cocoanut (kernel)	+ 2	+ 3	-	+ 1	
Cod-liver oil	+ 5	-	-	+ 4	
Cream	+ 3	+ 2	+ v		
Cucumber		+ 1			
Egg	+ 4	+ 2	-	+ 2	
Egg yolk	+ 5	+ 3	-	+ 4	+ 2
Fish (fat)	+ 2	+ 2	?	+ 1	
Fish (lean)	-	+ 1	-		
Fish Roe	+ 4	+ 2	?	-	
Grape fruit	?	+ 3	+ 5	-	
Grape juice	?	+ 2	+ 1		

Note. + indicates presence ; figures 1, 2, 3, etc indicate comparative presence.

Foodstuff	A	B	C	D	E
Green bean	+ 2	+ 2	x		
Halibut-liver oil	+ 5	-	-	+ 5	
Heart	+ 4	+ 4	+ 1	+ 1	
Honey	-	+?	-		
Kidney	+ 3	+ 3	+ 1	+ 1	
Lemon juice	-	+ 2	+ 5		
Lentil	+ 3	+ 3			
Lettuce	+ 5	+ 3	+ 5	+ 1	+ 3
Lime	-	+ 2	+ 1		
Liver	+ 5	+ 5	+ 3?	-	
Maize	+ 1	+ 2	-	+ 3	
Milk Condensed	+ 3	+ 3	+ 1	+ 1	
,, dried	+ 3	+ 3	+?		
Milk fresh (not pasteurised)	+ 3	+ 3	+ 1	+ 2	+ 1
Milk skimmed	+ 1	+ 3	+ 1		
Mustard oil	-	-	-	-	
Mutton		+ 2			
Oat	+ 1	+ 3	-	-	
Onion	?	+ 1	+ 3	-	
Orange	+ 2	+ 3	+ 5	-	+ 1
Pea (fresh)	+ 2	+ 3	+ 3	+ 1	
Peach (raw or tinned)	-	-	+ 3		
Pea nut	+ 1	+ 3	x		
Pineapple (raw or tinned)	+ 2	+ 2	+ 3	-	
Potato white	+ 1	+ 3	+ 3		
,, Sweet	+ 4	+ 2	+ 2		
Pumpkin	+ 2	?	?		
Radish leaf	-	-	+ 3		
Radish skin	+ 1	+ 2			
Raspberry (raw and tinned)	x	x	+ 4		
Rice bran	-	+ 5	-		

NUTRITION

Foodstuff	A	B.	C	D	E
Rice polished	—	—	—		
Rice whole	+ 1	+ 3	+ 3		
Rye	+ 1	+ 2	?		
Spinach fresh	+ 5	+ 3	+ 4		
Strawberry			+ 3		
String bean	+ 2	+ 2	+ 2		
Tomato (raw or preserved)	+ 5	+ 3	+ 5		
Walnut	x	+ 1	x	+ 1	
Wheat bran	+ 2	+ 3			
Wheat germ	+ 2	+ 5			+ 4
Wheat whole	+ 1	+ 4	—		

Explanation of the Table.

Vitamin A (Fat soluble) = Anti-xerophthalmic vitamin.

Vitamin B (Water soluble) = Anti-neurotic or Anti-Beri-beri vitamin.

Vitamin C (Water soluble) = Anti-scorbutic Vitamin.

Vitamin D (Fat soluble) = Anti-rachitic Vitamin.

Vitamin E (Fat soluble) = Reproductive Vitamin.

Diseases caused by deficiency

Xerophthalmia and susceptibility to bacterial infection.

Malnutrition, Beri-beri, Digestive disorders, Pellagra Scurvy.

Rickets and Osteomalacia.

Sterility.

Indication regarding signs in above table :

- 1 Contains the vitamin in small quantity
- + 2 Vitamin content fair.
- + 3 Vitamin content relatively high.
- + 4 Vitamin content abundant
- + 5 Vitamin content exceptionally large.
- Vitamin cont'n't no essential value
- ? Presence of vitamin doubtful.
- > Unknown.
- V Variable.

These tables are taken from Pharmacopœia of the Medical College Hospital, Calcutta, 1935.

Table of Weight in Pounds and Height for
Men at Different Ages *

Height	19-20 yrs	21-22	23-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59
5 ft	108	114	118	122	126	128	131	133	134	135
1 in	118	118	121	124	128	130	133	135	136	137
2 "	118	122	124	126	128	132	135	137	138	139
3 "	122	126	128	129	128	135	138	140	141	142
4 "	125	129	131	128	126	138	141	148	144	145
5 "	129	132	134	137	140	142	145	147	148	149
6 "	132	136	138	141	144	146	149	151	152	153
7 "	136	140	142	145	148	150	158	155	156	158
8 "	140	143	146	149	152	155	158	160	161	168
9 "	144	147	150	153	156	160	163	165	166	168
10 "	148	151	154	157	161	165	168	170	171	178
11 "	153	156	159	162	166	170	174	176	177	178
6 ft	159	162	165	167	172	176	180	182	183	184
1 in	164	167	170	173	178	182	186	188	190	191
2 "	169	173	176	179	184	189	193	195	197	198
3 "	174	178	181	184	190	195	200	202	204	205
4 "	179	183	186	189	196	201	206	209	211	212
5 "	184	188	191	194	201	207	212	215	217	219

NUTRITION

Table of Weight in Pounds and Height for
Women at Different Ages ²

Height	19 yrs	20	21-22	23-24	25-29	30-34	35-39	40-44	45-49	50-54	
4 ft	10 in.	98	102	106	110	113	116	119	123	126	129
	11 "	103	107	109	112	115	118	121	125	128	131
5 ft	"	109	112	113	115	117	120	123	127	130	133
	1 "	113	115	116	118	119	122	125	129	132	135
	2 "	116	118	119	120	121	124	127	132	135	138
	3 "	120	121	122	123	124	127	130	135	138	141
	4 "	123	124	125	126	128	131	134	138	141	144
	5 "	126	127	128	129	131	134	138	142	145	148
	6 "	129	130	131	133	135	138	142	146	149	152
	7 "	131	132	135	137	139	142	146	150	153	156
	8 "	135	137	139	141	143	146	150	154	157	161
	9 "	138	140	142	145	147	150	154	158	161	165
	10 "	141	143	145	148	151	154	157	161	164	169
	11 "	145	147	149	151	154	157	160	164	168	173
6 ft		150	152	154	156	158	161	163	167	171	176

² The Foundations of Nutrition by Mary Swartz Rose,
pp. 482—483

CHAPTER IV.

HYGIENE AND SANITATION

Introductory

Living in families and in village, the health of an individual is intimately connected with that of the family and also of the village. While considering how to preserve health, housing conditions for the family and general conditions of health for the village have to be taken account of. Some of the points for ensuring health for the family and the village are discussed in this chapter. The chapter has been named 'Hygiene and Sanitation'. Hygiene usually relates to consideration of individual health. Here we have discussed both individual and domestic health. Sanitation generally refers to matters of corporate life regarding health, the main items being water supply, disposal of excreta, drainage etc. Sanitary arrangements for the family and incidentally for the whole village have been taken up for discussion here.

HYGIENE AND SANITATION

The House and its Surroundings :—In order to be healthy, one must live in a healthy place in healthy surroundings and in a healthy home. For millions there is no choice about the place, the surroundings and the home. Poor people find themselves born in a home and have to pass their lives in the same home. When on account of increase in number of members in a family, it becomes necessary to construct a new house, the tie for the old one most generally binds one to build near the site of the old house and the old surroundings. Even where for other causes a villager gets freed from old ties and has a choice of selecting a site for himself, he generally follows the custom blindly and unless he emigrates, he finds himself falling into the old method for he knows no better.

For the villagers therefore, it is necessary to know how they can make their existing habitation healthy. Once this knowledge is obtained and improvement in old houses begun, a newer knowledge of house construction will prevail and those who construct new houses and emigrate to a new place will know how to choose a healthy site and construct huts for healthful living. The reform must begin from the existing homes of poor men in the villages.

The soil for the homestead should be sandy or sandy clay. Clay is unsuitable for sites for building houses. Clay does not absorb water and during the rains the place becomes particularly full of mire, slippery and unhealthy. For old houses erected on clay soil, a pit

SOIL FOR HOMESTEAD LIGHT AND AIR

may be dug near about to find a sandy layer. If such a layer is found within workable distance, it should be tapped and a foot or so of sandy soil spread over the yard and paths also to some depth on the floors. Pure sand will not serve the purpose, a mixture of sand and clay in the soil would be most suitable. This reform rarely requires any expense except the labour of the inmates. This can be done during months when the family members are otherwise free from field labour.

Light and Air:— The house should face the direction of prevailing wind and access of light and air should be ensured. Over very large tracts of India there are certain periods when cyclonic wind blows. This may be for a week or a day at different periods of the year. Again cyclonic gale may visit three times in the year and on any day may assume such proportion as to blow away unprotected huts. The houses therefore are made to be encircled with a range of trees. Plantain trees, fruit trees, trees for fire-wood and bamboo groves all surround a house. A newly built house is remarkable for its openness. But in a few years the familiar jungle is built round. This belt of jungle affords the householder protection from ravages of seasonal gale, gives privacy to the entire house and particularly to women to answer calls of nature. The jungle and bamboo grove supply the householder with fire-wood and materials for hut repair and construction. No care is taken in planting the trees. Any chance seed germinating and growing to a plant is allowed to

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HYGIENE AND SANITATION

develop which is preserved. While trees and creepers struggle for growth and development, a dense undergrowth makes the place difficult of penetration. The trees shut out air and light from the house and therefore health. While men have considerable outdoor life in the fields, children and women suffer most. The remedy lies in thinning down the circle of trees around a house or a cluster of houses. This may mean some inconvenience. Trench latrines may have to be installed for loss of protection of privacy on account of clearing. Fire-wood may have to be bought. But the payments that are made for absence of light and air in homes in the shape of loss of health and consequent loss of earning and in loss of life are certainly more than what is gained by protection from gales or by the supply of fire-wood or fruits in case of fruit trees cut down for admitting light and air into houses.

In villages there are shade spots where light and air are shut out to an unusual extent. Inhabitants of these areas will be found to suffer from illness more than others. If these facts are brought out and ways shown for improvement of house surroundings in the matter of inlet of sunlight and air, something may be done, the task although seems to be baffling. There are examples of combined work for common good in certain direction in some villages. But this thing, touching the immediate income and convenience of householders is difficult to be introduced as a common programme.

HOUSE SANITATION DRAINAGE

House Sanitation — Where a family is suffering from chronic ill health in one form or another, enquiries should be made about the general sanitary conditions. If sufficient light and air are not available, if in addition the house suffers from inconvenience in the matter of a suitable supply of good drinking water and facilities for disposal of excreta, then it would be advisable to change the house and build a sanitary one in open and healthful surroundings.

Drainage — Natural slopes, elevations and depressions characterise a piece of land. In alluvium the surface quickly changes by currents of flood water and by silting up of rivers and depressions. In rocky countries the land features are more or less permanent. Land formed out of silts from rivers shows a great and continual change. For example, the surface of Bengal is visibly changeable on account of its great river courses. The rivers flow in a particular channel, but the huge mass of silt brought down annually from the hills silts up the bed. Inundations deposit silt on the banks of the river and raise its level. In this way the levels of both the river-bed and river banks rise up. After a time the river-bed gets higher than the surrounding lands. Then the river cuts through its banks and creates a new channel for itself, and abandons the old bed. The old river-bed then retains only a stagnant pool of water. This is the dead river. The drainage of the area is received by the old channel. This natural change is continually going on in alluvial formation of land. Bengal delta has

HYGIENE AND SANITATION

been formed by such changes of the courses of rivers. The result is a great change in the land. Rivers give life to the surrounding country side. When a river dies, the population living on its immediate banks suffers materially in health on account of stagnant water breeding mosquitoes. Malaria in a serious form attacks people and in a vast number of cases the area gets depopulated. The death of a river means death to the population immediately served by it.

It will be apparent from this how serious is the obstruction of natural flow of water for any area. But apart from natural causes the railway embankments and district board roads cause serious obstruction to the flow of water. The result is interference with the drainage and consequent ill health of the population involved.

Large schemes for drainage cannot come within the scope of operation of a village worker. Apart from these larger questions, there are smaller problems of village drainage, attention to which may correct some faults in drainage. A *nullah* re-excavated or a bund repaired often improves local sanitation, these points should be enquired into and defects in drainage repaired.

House should be constructed in a plot which is capable of being drained. If the house is on a raised plot of land made up from excavations, then the plot may be sloped so as to drain to the excavation and from there get absorbed in dry months or get mixed

WATER SUPPLY WELLS · TANKS

with rain and flood water in wet months. Such a pit should not be used for water supply for domestic purposes at any time. The surface of the level of the house should be at least 2 to 3 ft above the flood level so that during floods the site may not get water-logged too close to the surface. If the plinths are raised a foot and a half and they are made of sandy soil, they will not be damp.

If there is no proper drainage, wash water will accumulate in pools here and there and give rise to insanitary condition by rotting.

Water Supply — For drinking water ring wells are economic and sanitary. If surface water from the house is properly drained away then ring wells cannot get contaminated from sub-soil water. There are localities where ring wells are not in vogue. In such places the sinking of ring wells may be introduced. Where the level of water is very deep or where the soil is rocky, it is not possible to have ring wells. Ring wells are suitable for alluvial lands. In rocky soil bigger wells have got to be sunk till water is found. It is not possible for villagers in such areas to possess a well for every house. Common wells for the village have to be sunk in such cases. The excavation of tanks for water supply is a great thing, provided the tanks are kept in a sanitary condition and arrangements are made to shut out entrance of foul water and occasional cleaning out of silt.

As things stand, excavated tanks are not preserved with the care necessary in order to use them as

HYGIENE AND SANITATION

sources of drinking water supply. Still they are there. Steps should be taken to select a few for drinking water and reserve them. Other tanks may be used for bathing and washing clothes and yet others for bathing and watering of cattle. The tanks for drinking water supply should be quite distinct from these. In a very large tank if a few persons take their bath or clean occasionally a piece of cloth, nothing very wrong can happen provided excreta and clothes of patients suffering from contagious diseases are not brought near the tank. But when in a small tank all sorts of people bathe, wash their clothes and clean cooking utensils, then it stands condemned.

In Bengal, during the three or four rainy months all water becomes one. The tanks, nullahs and house-gutter all get merged in a sheet of water, the identity of each individual source of water supply is lost. Rivers are flooded. It is most difficult to obtain uncontaminated water then. To serve as reserve tanks for drinking water, the embankments of tanks should be raised so that flood water may not get in. But this is also a very costly thing. Without overflowing, fishes will not enter and the income for fishes from the tanks will go down. For these reasons all tanks are kept connected with flood water. But what is gained in fishes is lost in health due to the use of contaminated water.

Latrines and Water Supply :—I am speaking of Bengal here and more particularly of East Bengal. People here suffer for want of raised land. In many

LATRINES . RIVER WATER

houses they do not keep sufficient land to erect a latrine or trench the night-soil. The whole population uses the water channels as privy. Some have permanent latrines erected on slopes of their houses, even when such a slope is on a water course. People do not mind the proximity of latrines. In the same house the bathing ghat may not even be twenty feet away from the latrine where human excreta are allowed to drop in and foul the water. People drink also this water which they themselves visibly contaminate. These very people again in the dry season use water from excavation pits which are used for house or street drainage all the year round. It is not that it is impossible to arrange for supply of pure drinking water in all seasons. People can arrange for that without expense or State help by co-operative action. But the fact is that they have lost all regard for supply of pure water and do not consider it wrong to foul sources of water supply with drainage effluent and human excreta. Villagers have lost all incentive to co-operative action. It is staggering to find a whole people having lost all sanitary sense in the matter of water. Drinking water should be taken care of if disease is to be prevented. As a general measure persons should be trained in the habit of refraining from fouling water.

River Water —River banks are used as latrines by the population of the villages on either bank. All these excreta find their way ultimately into the river. The water gets contaminated. Some have the

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pernicious custom of throwing dead bodies and carcasses in rivers. If the dead body is of a cholera or typhoid patient, this successfully spreads epidemics. The body rots in all cases and contaminates water.

Safe Water For Drinking.—Unless water is used from a ring well or a tube well or a reserve tank, all water for drinking should be briskly boiled and cooled down for use. Where the water is muddy a few grains of alum should be added to it and kept for settling. The settled water should be decanted off and boiled to kill all germs before drinking. Boiled water tastes insipid for drinking but does no harm. Taste is a matter of habit and if boiled water is taken regularly after a time the insipidity of it will not be perceived.

Bed Rooms.—Rooms set apart for sleeping should have as few pieces of furniture as possible. In this respect poor people ought to be better off. They have little encumbrance by way of furniture. But it is possible to make even a poor man's room stuffy by storing useful and useless things. In villages, rooms are generally separate structures. For each such unit it is easy to ensure access of sunlight and air in plenty. But this is not done. Windows are rarely kept. Where there are windows they are too small or improperly located. For ventilation walls should have windows straight opposite to each other so that a current of air may pass. If there is only one door there should be at least three other large openings for ventilation for a small unit.

BED ROOM STORE ROOM

For sleeping, floors should not be used as is done in some places Damp may affect health adversely and snakes and insects crawling on earth may bite Some have low and fixed scaffolds or *mancha* for sleeping This is also insanitary Being immovable all sorts of dust collect on the top and the floor underneath is kept damp and dirty being unapproachable If these are made sufficiently high so that a person may conveniently sit below and clean the floor then it is quite good Otherwise *charpoys* should be used for beds They are removable They may be taken up during the daytime and sunned occasionally and the part of the floor occupied by them may be kept in a habitable condition, dry and dust-free

Store Room —The store should be cared after from the point of view of sanitation If a store is kept in an untidy condition, snakes and reptiles find there comfortable places for habitation The more unnecessary articles are there, uncovered and uncared for, the greater invitation is there for rats to come and inhabit Rats are naturally followed by snakes A house infested with rats is a house infested with snakes Care should be taken to store only what is needed and to take care of that which is stored Useless materials may be burnt or made into manure

The rooms whether for sleeping or for store should have access of plenty of air and light Villagers are not cramped for space like towns people and if the conservative habit of building more and more huts in the same quadrangle with an increasing family be given

HYGIENE AND SANITATION

up and if the surroundings are cleared of jungles, a village home should be an ideal sunny place. At present it is not so. If the health and life-giving property of light and air are known and their wants felt, all damp and dark sheds may vanish. Again houses may be seen in sunny surroundings from the interior of which light and air are scrupulously shut out. People may be seen living in houses erected in fields with few trees about and no jungle, the interior of which requires for the unaccustomed a lamp at midday to discern the objects within. Neither poverty nor want of space can be pleaded for this state of things. Want of sanitary knowledge is the reason along with bad habit continued from ages.

Cowshed :— Cowsheds should be situated in a clean surrounding. The more jungly the surrounding is, the greater harm is done to the cows by mosquitoes and flies. The daily droppings from the cowsheds should be stacked at one place and rammed down with the litter and sweepings. As the heap grows to some height it should be covered up with dry earth and deposition continued at another place. During the dry months such treatment is found to be quite sanitary. Urine should be allowed to drain into a pit and from there taken direct to the field, if the condition of the floor of the shed will allow drainage to a pit. Generally it is difficult to arrange this. The next best thing is to scrape the moist floor. The floor should have slope. The clay-like mass should be cleaned off and kept with cowdung.

COWSHED KITCHEN

A quantity of dry earth is to be sprinkled occasionally over the floor and rammed down. This prevents formation of pits on the floor and keeps the floor dry. Dry earth is a great necessity for sanitary living in areas where there is much rainfall. However high may be the rainfall, the use of dry earth can contribute to much comfort and keep the house in a sanitary and clean condition. Manure should be kept stored under protection of some sort of shed during the rainy months.

A cowshed attracts flies and other insects. A portion of the litter is to be burnt daily in the evening without allowing it to blaze up by sprinkling some water on and off. This evolves plenty of smoke while the mass burns slowly. A small quantity of litter may then be kept smoking for a considerable period. The smoke keeps the shed sanitary and saves the cows and household from flies and pests. Cowdung mixed with earth forms a good protective plaster for the floor. The floor becomes easy to clean and remains free from much dust. The yard of the cowshed and the yards of the household are usually kept clean by moist coating of earth and cowdung mixture. Thinnest possible layers are spread over which dry quickly and keep the yards in a clean and dustless condition.

Kitchen — Many cultivators in North Bengal prefer cooking in the open air. They select a corner in the yard of the house and raise low mud walls about it and have their *chula* or fire place here. The

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place is kept spotlessly clean and cooked food is removed inside the room. This keeps the kitchen free from smoke and clean in every way. The habit of cooking in the open air is so ingrained in them that on rainy days they will wait the shower to stop and then cook. The chula is protected from rain by a big earthen *gumla* or a basin placed over it.

The cooking utensils are to be daily washed and scrubbed. In many rich families where much is spent in food and cooking, this necessary thing, the daily scouring of cooking utensils is not done. Brass vessels are best for cooking. But many have to use earthen-ware utensils. These should better be changed as often as possible. Another sanitary way of cleaning earthen-ware vessels is to burn them. After all food material is scoured off, clean the vessel by burning over a slow fire. After this treatment the vessel becomes like a new one for cooking purposes.

Food.—Food should be eaten fresh after cooking. Boiling kills bacteria. Cooked food should therefore be bacteria free. It is so. But bacteria get access to cooked food through flies coming and sitting over food or utensils. Water used for washing plates and vessels may contain bacteria and may contaminate food. Where water used is known to be pure and from uncontaminated sources, cold water may be used for washing purpose and also for drinking. Where the source of water is doubtful and during epidemics when extra precaution has to be taken. All water

FOOD DRINKING WATER RAW FRUITS

used for drinking, final rinsing of utensils and for washing and cleaning the mouth at any time, should be boiled water Mere warming is no use Water must be boiled to free it from bacteria After boiling if water has to be stored it should be kept covered and used as soon after as possible

There is much chance of contamination in the interval between cooking and eating Food cooked and served hot is perfect But it is not possible always to ensure this Cooked food then should be stored in a way so that no flies, insects or ants may get on it or that it may not get contaminated in any other way During cholera epidemics or when there are cases of typhoid or dysentery in the family or in the neighbourhood, food should be served hot The hands, of course, should be washed free from all dirt Nails should receive attention at all times They should be paired close and kept free from lodgement of dirt

Frequent heating of food is bad Vitamin A in food gets destroyed by heat in contact with air Every time a food is cooked, some vitamin is lost This should be remembered Reheating of cooked cold food before serving is harmful inasmuch as vitamin gets destroyed

Raw food, fruits and vegetables should be eaten with great care There may be dirt or contamination in vegetables or rice or atta before cooking But cooking kills bacteria When however vegetables are to be taken raw, they should be cleaned leaf by leaf

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to get the material freed from maggots and insects. Fruits at the time of being plucked from the trees may fall on soiled earth and get contaminated with faecal matter or maggots or eggs. Worms find entrance into the stomach and intestines very often in this way and also through the use of contaminated unboiled water. Water when taken cold should be classified with uncooked and raw food.

Eating from the same plate is bad. It is not the want of plates for which children and sometimes grown-up men use the same plate for eating. It is a bad practice and should be given up for considerations of health. Many diseases e.g., tuberculosis, pyorrhoea etc may pass on from one to another by contact through food eaten from the same plate

Feasts :—There will be feasts. It is upto the managers of such feasts to observe scrupulous cleanliness on such occasions. Only tried and clean men free from infectious diseases should be allowed to cook and serve. Their persons should be examined, they should clean their bodies, wear clean clothes and have clean nails and clean hands. Above all they should have clean habits. It is a common sight to see perspiring men serving food and drops of perspiration falling on food. Server's task is heavy and his work may make him perspire. He should wear such clothes as may absorb perspiration for the time. Public feasts are as a rule made ready past the usual hour of taking food. Then the food also may be too rich in proteins. There may be

FEASTS CLOTHING SENSE OF DECORUM

contamination during serving through plates and from water. Epidemics are not unusual to follow feasts while indisposition of many is a rule. It is not a healthful custom. If nothing better than a public feast can be devised for enjoyment then the feast should be such that it may be said that the articles of food were clean and pure, that the food was cooked and served by men free from infectious diseases and men whose personal habits of cleanliness were beyond question, that the food was served hot on clean plates or leaves and in proper time. That the food chosen was such as an ordinary person might digest without disturbance of digestion. If a record was taken, few feasts will pass such test. Where the health of a large number of persons is concerned, no care taken to ensure sanitary and hygienic conditions can be said to be too much. On the other hand, the managers of such festivities may take pride in declaring that they had passed all tests.

Clothing —Clothing protects the body from heat and cold by providing a non-conducting but porous layer over the skin. When the direct rays of the sun on the skin make one uncomfortable, a covering of a piece of cotton cloth at once gives relief. Cotton is suitable for direct contact with the skin. Perspiration is absorbed by it which on washing is cleaned off. Woollens are not so suitable for use in direct contact with the skin.

The protection given to the skin is an acquired habit of comfort. But for this acquired habit, men

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might very largely do without clothing. Cultivators use very little clothing while out in the fields. Even in winter in the hotter regions, just a thin cover is enough for them. This is because the skin has become more resistant to influences of weather in maintaining the body temperature.

There are naked *Sannayasis* who do not use any clothing and are none the worse for that. As I have said, requirement for clothing is an acquired habit. I was amazed on hearing that one of our acquaintances had an experience of living entirely naked in forests. But quickly came the reply that all are partially naked and that none covers the face even in coldest winter. If the sensitive skin of the face can withstand cold, the skin of other parts of the body ought to bear cold if called upon to do so.

By habit continued from remote ages, clothing has come to be associated with decorum. On going out of home one has to dress according to the social custom. Here clothing is used so that the sense of decorum in others may not be offended. Clothing then passes off from the region of protective covering to one of decoration. As little clothing as possible consistent with the sense of decorum of one's society should therefore be used.

For protection from weather, air in between two folds of cloth is more efficient than two thicknesses of cloth. Where protection is the object it will be comfortable and less costly if clothing be arranged in layers. One coat or shirt over another or one wrapper

DIRTY CLOTHES AND BEDDINGS ALKALINE ASHES

over another would be more non-conducting and lighter than single coat or wrapper made of thicker cloth

Clothes in direct contact get soiled by absorption of the excreted material thrown out with insensible or invisible perspiration continually passing out of the skin This excreted material will soon make the clothes worn in contact with the skin, smell foul. They should be washed off this dirt Clothing gets dirty on use from dust and oily matter also Washing is necessary for cleaning off thick dirt Mere washing with water is not enough for long The particles of dirt adhere to the fabrics and give them a dirty colour By the use of alkalies in the form of washing soda, these dirts get loose on boiling and fabrics can then be washed clean Soap serves the same purpose more effectively. Alkali suitable for washing purpose is present in ashes of leaves Plantain stalk and leaves and the whole tree, on being split, dried and burnt yield ashes rich in potash carbonate which is quite suitable for washing purposes Poor people who cannot wash off dirt from their clothing for the expense of soda or soap may use this inexpensive article It is often a habit to use dirty clothes and dirty beddings Poverty is a contributory factor The more wash, the more the wear and tear But poverty is not the sole factor The habit of using clean clothing and bedding has to be cultivated for maintenance of health Skin diseases frequently arise from use of dirty clothing Houses

HYGIENE AND SANITATION

will be found where the same pillows or the same quilts are being used for a score of years and half a dozen children reared on the same bed without a wash. This is due to habit and a very unhygienic habit

Beds :—It may not be possible to wash the beddings often enough. Bed covers should be used and these should be frequently washed. Beddings should be regularly sunned and occasionally washed. Stuffed articles of bedding should have their stuffing taken out and both the casing and stuffing washed and refilled periodically in order to keep them in a sanitary condition. The same treatment should be given to quilts. By unstitching, the casing can be removed. The pad of cotton may then be taken to pieces, boiled with soap and soda, dried, carded and restuffed. Blankets are more sanitary than quilts and whenever possible, blankets should be used in preference. Blankets may be easily washed, sunned and kept clean.

Articles of Personal Use :—Shoes are insanitary. They keep the feet enclosed in the impervious casings of leather. There is therefore interference with the evaporation of perspiration. If socks are worn they should be daily washed and dried. The smell from used socks is sufficient to convince one about the unhygienic character of their use.

When shoes are used they should be such as not to press on the toes nor squeeze the feet. They should be large enough to comfortably accommodate the feet when flattened under the weight of the body in

SHOES SANDALS JEWELLERY

walking The foot flattens out and covers more surface when standing and walking than when sitting

Sandals are better being lighter and more sanitary although they do not afford protection to the whole feet like shoes

Wet shoes or sandals are insanitary Wearing of wet shoes amounts to putting a cold compress on and around the feet When shoes get wet they should be allowed to be dry Wooden sandals are well-suited for use during the wet season In the pattern in which the sole has a vertical knob to be clenched by being inserted between the big toe and the next one, there is nothing to get wet except wood Wet surface of wood does not affect the soles and are quite sanitary that way The habit of using them has got to be acquired with some trouble Even the tough skin of the toe gets inflamed and vesicles form on wearing sandals with knobs When the vesicles heal they may be again tried till one gets accustomed to these wooden sandals

Jewellery have nothing to recommend in them for use They attract thieves, the possessors have to be careful for them and it is well-known that many children die at the hands of cruel men who murder them for the sake of their jewellery

If a healthy frolicking calf is decorated with bangles, nose rings, ear rings and necklaces, the calf will feel miserable and the on-lookers will laugh. They will laugh rightly at this vain attempt to embellish what nature has given The jewellery will

HYGIENE AND SANITATION

not adorn a calf, on the contrary, they will disfigure it and decidedly interfere with our sense of what is beautiful. What applies to a calf in this matter applies with equal force to children, men and women. The pity of it is that we have not the eyes to see the ugliness of these ornaments. They are marks of position or rank or wealth and also marks of love bestowed on the wearer by their givers. This is a wrong valuation. The wearing of ornaments or jewellery is based entirely on wrong values being put to what is beautiful.

Jewellery catch dirt and invite disease. Children have sometimes gold, silver or brass pieces strung together by cotton threads and put round the neck or wrists or ankles. The cotton threads get wet and catch dirt. They are not easily replaced, not till they have lost strength to keep the pieces bound. This happens after a pretty long wear. If one smells these cotton braided pieces, one will be forced to turn away the nose. They are foul-smelling rotting things, catching and breeding bacteria. If fluid like milk somehow gets spilled over them, then obviously the surface becomes a good source of bacterial culture. Jewellery have no place in hygienic regulation of life and should be discarded. Some women use bangles or a plain wire of iron as a mark. There is no harm in wearing them as marks, if the bangles are found inexpensive and have no place in them for lodging dirt.

Towels :—Towels used by one person should not be used by another. These personal articles of use get thorough saturation with waste materials of the user

TOWELS : SOAP DISPOSAL OF EXCRETA

and should be avoided by others Children should have their separate pieces Poor people make their towels or napkins out of old cloth These are costless and certainly each may have one even in a poor family. Napkins and towels should be frequently washed with boiling soap and soda water

Soap — For cleaning the skin only high class soap is good Common soaps and washing soaps contain alkali and irritate the skin instead of soothing it If oil is rubbed over the skin and then massaged, some oil will still remain. This oil may be taken off by a paste of oilcake Oilcake has the property of absorbing oil and making an emulsion The skin may be cleaned off its extra oil by use by oilcake Cake is powdered and soaked in water so as to form a thick paste The paste on rubbing over the skin, will take off oil and give a refreshing pliant surface to the skin.

Disposal of Excreta — Human excreta are a rich manure But in villages they are a source of annoyance and pollution The best way for disposal of excreta is to use removable latrines on trenches A pit is dug about one and a half feet in diameter and a foot deep Over this is placed a latrine, a light structure of some sort of matting or reeds having a narrow door. A cheap mat may be suspended in place of a hinged door. After use the excreta are covered with dry earth It is used at one place till the hole is quite full After which it is shifted a few feet away to be used in the same manner The latrine is inexpensive A few pieces of bamboo, some reeds and a few hours' labour

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may go towards making such a latrine. The latrine may be shifted by two persons from place to place. The used-up hole is covered with more earth and neatly rammed. After two months the pit can be re-excavated and the manure removed and the place used again.

Where the removal of latrine is regarded as difficult but where some land is available, a plot may be enclosed and a trench dug. As the trench is used from day to day and covered over with earth, fresh lengths are taken up. When one length is finished, a parallel trench is cut and used in the same way. After several months, prepared manure may be removed and the trenches re-excavated and re-used. This system is exceedingly healthful and an ideal one for villages. There is no expense. A great nuisance by the way of rotting excreta about the house or river-beds is got rid of and in addition valuable manure is obtained. Dry earth is to be stored for use during rains for these latrines.

When men and women cannot be induced to use this system, where they must go anywhere and foul places, they should be induced at least to cover up their own excreta. This is no difficult thing. A three inches blade of iron with a handle as is used for household and weeding purposes, is taken along with the *lota* or water pot for going to answer call of nature. A small hole is to be dug by a few strokes and after the excreta are deposited in the depression they are to be covered with the clods excavated out. This keeps off

TRENCH LATRINE SPITTING SWEEPING

flies, prevents their breeding on them and at the same time enriches the soil

The habit of throwing effluents from the nose, spittings and cough any where without consideration is a dirty and reprehensible habit These should be treated as excreta as they really are and should be disposed of carefully. At homes they should be thrown at out of the way places and covered up with earth While on streets they should be thrown in such a manner and at such places that the next passer-by may not be inconvenienced by them or be infected by the disease germs that may be in them Patients suffering from infectious diseases should take care that their excretal matter is disposed of under earth and not allowed to contaminate the surroundings

Disposal of Dirt —In a house every thing may have use When properly kept at suitable places dirt ceases to be dirt Most dirt and sweeping may be converted into manure by being buried under earth or kept in a heap and occasionally moistened Sweepings form valuable manure Twigs and leaves which remain strewn about may be used for kitchen when properly sunned and beaten free from earth When it is inconvenient to use them for kitchen, leaves may be put under a layer of earth to rot and be converted to manure Useless sticks etc which cannot rot and are not fit for kitchen may be used for fumigating the house and surrounding and the ashes used for manuring

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Fire is a great cleaner. Where a thing can neither be converted to manure nor used for lighting a fire and has no sale value either, it should be consigned to flames.

Disposal of dead bodies also plays an important part in sanitation of the village and home. The process of disposing of the dead body by cremation is faultless and no other method can equal it. By burying offensive gases may come out. Then there is a moral objection too. Why should several square feet of earth be occupied permanently by a body for which there is no need to do so? In the philosophy of social economy this is a consideration which ought to weigh.

The Hindu custom is excellent. In practice however, it is not always conducted with proper care and consideration. A look at the burning ghat of any village will be convincing. All dead bodies are not reduced to ashes wholly. When there is a dearth of fuel or where there is an inclement weather, irresponsible parties somehow finish their task leaving traces of unburnt body. It is not unusual to throw partly burnt body in water thereby fouling the water courses.

The beddings etc. of the dead should be consigned to flames. This is not done. They are left strewn about. The pillow is torn and left to the winds to blow the cotton and scatter. All pieces of wood used for burning are not wholly burnt and half burnt logs of wood and pieces of bamboo are left strewn about.

A village cremation ground is no neat place. Broken and waste materials are strewn about, torn

VILLAGE CREMATION GROUND . DEAD BODIES

remnant of beddings and half burnt pieces of wood offer a spectacle of desolation and untidiness. It is not sanitary either. There is no common law about disposal of the dead in a cremation ground and public conscience is apathetic to the condition in which a burning ghat is kept. No special care is taken about the disposal of the bodies of persons dying from infectious diseases. The relatives of a man who dies after suffering for a long time are required by the caste men to perform *prayashchitta* or atonement before the bearers would consent to carry the dead. While this reprehensible and torturous custom exists, the bodies of those who die of infectious diseases receive no special treatment. The corpse in such a case is treated like any other corpse. The body of a person dead from infectious diseases should be handled with care so that infection may not spread to the carriers or may not spread through contamination of water or from beddings and clothings left behind.

Mussalman villagers in Bengal generally bury their dead in their own compound. This is not good. The water supply of the house may be contaminated and offensive gases issuing out of the decomposing body may affect the health of the members of the house.

Disposal of carcasses of animals is also an important problem. Any person may throw carcasses of cattle owned by him anywhere outside the house in a jungle, near a road or in the river. The worst way of disposal of carcass is to throw it in water. The skin is lost and the decomposing dead body

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makes the water foul. The body floats down stream and fishes feast on it. A stage of decomposition is reached when the bones get disjoined and individual pieces of bone shorn of their flesh sink down to the river-bed.

In areas where during the rainy months high land is scarce, dead cattle are thrown away in water as a matter of necessity. *Chamans* are on the look out for them. When they find a floating carcass, they pull it somewhere to a shallow place and flay off the skin and leave the flayed body in water.

Throwing away of the carcass anywhere on land is much better than throwing away on water courses. On land the vultures see it and circle down on it. The vultures are slow and hesitating birds. They do not sweep down on the body. They first wheel down from the sky and sit on the top of a neighbouring tree. At the next moment they alight on the ground some distance away and then gradually approach the carcass. Dogs being bolder than they, are at a carcass as soon as they see one. It may be that the vultures find the process of tearing of the skin a difficult job. They wait for the dogs to start. But as soon as the dogs have torn open, the vultures simply cover the animal by their number and the dogs have to wait till the vultures have reduced the body to a skeleton. Before the vultures are on the animal, chamars know and trace the body following the course of vultures and are generally on the scene to flay off. The vultures wait patiently till the process is over and

VULTURES DOGS UTILISATION OF CARCASS

then struggle with each other for approaching the carcass and have a bite They make a quick job of it. In a few minutes all flesh is gone

The remnants are allowed to rot in the open air for days, the dogs being at them all the time These very dogs visit houses and may even enter kitchens The vultures are regarded with disgust but not so the dogs which begin to bite at the bones and rotten flesh after the vultures have practically finished The injury to public health by this method of disposal is obvious Dogs establish a line of contact between the house and a foul and decomposed body full of bacteria

It is evident that both of the methods of disposal of carcasses are dangerous from the view point of public health These are the only methods pursued all over the land except where certain people eat the flesh of certain classes of carcasses But this is not universal A dead animal is no food for human beings and where the custom exists, the people should be weaned away from this habit

There is a third method of disposal of carcasses. It is its full utilisation for industrial purposes The hide is used for tanning The flesh and bones are boiled, fat separated and used for industrial purpose. The flesh is dried in the sun or on heated pans, powdered and used as a manure and the bones are superficially charred and powdered and then used as manure Horn and hoofs are also used as manure Nothing is wasted This method needs introduction

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at the hands of pioneers The people who flay hides will not take the trouble to save waste, preserve sanitation of the village and also earn something more than what is obtained for the hide. Generally hide brings one third to two thirds of the total value of the carcass Village workers may acquaint themselves with the scientific process of disposal and try to introduce it in villages

CHAPTER V

NURSING

Introductory

If a person falls ill, the first impulse is to run for medicine although when the body is healthy proper care is seldom taken of it. Many diseases are preventable. But preventable or not when diseases appear, the first thing is to take proper care of the diseased system. This is called 'Nursing'. A healthy person takes care of his body and of his requirements himself or nurses himself. In disease he needs the assistance of others to take care of him or in other words requires nursing. By proper nursing much distress can be relieved and obstacles to recovery removed. Proper nursing or care of the system is of first importance in disease. We shall deal with the subject from the point of view of a poor villager. He has no separate room to accommodate a sick person. The floor of his hut is of dry earth and cannot be cleaned like a cemented floor. There is no chance of his getting hospital requisites for nursing. He is to do the very best that he can within his means.

Some appliances like the thermometer and the douche-can have been mentioned for use in the sick room. These may be borrowed from the village doctor.

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Those who cannot procure them must necessarily do without them. For those who can and who would, the use of hypodermic syringe has been recommended. It is not that every village home must be with these appliances. But a set of these and similar most necessary appliances may be kept as common property and arrangement may also be made for their replacement in case of breakage or loss. In almost every village there is some sort of corporate life still existing. This centres round a temple or a mosque. Appliances for nursing and treatment may be made common property and kept in custody of the village worker, who may be trained to their uses.

The first object of attention should be the room where the patient's bed has been put. If there is any choice, the best room in the house should be given to the sick. A little doing-up will be necessary for making the room fit for receiving the patient. All extra furniture should be removed. The walls should be swept free from dust. The floor if *kuccha*, should be made clean with a 'lep' of earth and cowdung. All possibility of improving the room should be tapped, so that all the air and light that may come into the room are admitted.

The bed should be preferably on a charpoy. In Bengal, poor people do not use charpoys for bed, but mostly use the floor. If the floor is not dry, a bamboo charpoy should be made if it is possible to do so. The clothing of the patient should be changed and a clean set given. The body of the patient should be

DUTIES OF A NURSE . CASE-TAKING

cleaned and plans thought out as to how nature's own healing agencies may operate Sunlight, air and water should be allowed to have their beneficial influences. Sunbath, waterbath, free ventilation and massage should be arranged for.

The centres of disease must be explored and nursing directed to them The nurse should take reading of pulse, respiration and temperature on taking up the case and subsequently every morning and evening extra reading should be taken as emergencies arise Where in protracted cases, it is necessary to keep a record of the condition for regulating treatment, a note book should be kept where entries should be made It may not be possible to keep such record in every serious case, but where possible notes should be kept if the nurse is literate

The tongue should be examined to obtain indication of the condition of ailment The eyes and lips should be seen to determine if there is anæmia The skin should be examined for eruptions and diseases of the skin The throat should be examined for pharyngitis or laryngitis The liver and spleen should be felt for enlargement or shrinking or pain Condition of urine should be questioned about If there is pain, its character should be known The character of stools should be ascertained Existence of worms in the intestines should be guessed and if there is fever the nature of it should be known To shorten the enumeration, we shall imagine as our patient a much-diseased man having all the diseases, the

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symptoms of which are discussed in the Home Treatment of Symptoms in the following chapter

Having got a much-diseased patient what is our nurse-to do with him ? The word nurse is issued here in a wide sense. A nurse may be a male or a female person. The nurse may be the father, the mother or a son in the house or a nurse may be a village worker or he may be the village doctor himself A patient may require hot or cold application, sponging, wet pack, cold immersion or simply pouring of cold water on head. Hot foot bath or sitz bath may be necessary Again the patient may require cold compress or hot compress. He may need to be vomited or need his stomach to be washed out. He may need an enema or rectal feeding. He may need poultice or inhalation or fumigation. His skin may swarm with vermin or he may have suppurating wound requiring washing and cleansing or he may have skin diseases requiring a paint or an ointment or a lotion. He may require an anodyne to stop his pain Our nurse should be able to meet these and similar needs In order that he may perform his duty cleverly and intelligently he should be initiated into the scientific method of nursing.

The nurse will have further to acquire some knowledge of weights and measures and learn something about medicine also. In the next chapter on the Home Treatment of Symptoms it has been indicated how the symptoms observed by the nurse are to be treated. The two subsequent chapters, Care of the

SOME HOME REMEDIES

Mother and Child and Accidents are extensions of the same subjects of nursing and treatment at home. These chapters presuppose that the reader has gone through the first four chapters on Human Body, The Care of Organs, Nutrition and Sanitation In fact it is only after going through these chapters that it will be possible to understand fully the methods and treatments suggested These seven chapters from the Human Body to Accidents form one course, the study of which may qualify one for treating patients at home provided one goes through the rest of the book also

Some Home Remedies

The nurse according to our definition is a doctor also In fact a doctor is first a nurse and then a doctor A doctor has to see the sick, diagnose, prescribe and give medicines A busy doctor has to do all these But when a doctor has only a single patient to attend to he may do something more than merely prescribe medicine He may remain at the bed side and minister to the comfort of the patient also. A father or a mother or a son in the family has to do this If the nurse knows the diseases and how to treat them, he becomes both a nurse and a doctor A home doctor is such a nurse and a doctor A nurse has to handle medicines In the next chapter methods are indicated for treatment of symptoms Besides the application of water and sunlight, of massage, heat and cold some medicines also have been recommended These medicines are cheap and

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available in every centre of trade and may be conveniently obtained in the remotest villages from the nearest marts of business. A list of medicines, their preparation and uses are given at the end of the chapter. The nurse should do well to study them and get acquainted with them so that he may follow the mode of treatment adopted in the next chapter for various symptoms

THE SICK BED

A poor patient has to use the bed he is accustomed to also in illness. The bed however should be cleaned, dusted and sunned. The sheets and covers should be boiled in soap and soda and freed from all dirt.

Where necessary a mattress may be improvised. Two thick sheets of any material, cotton, wool or jute are to be sewn together making a casing. Clean straw is to be taken and introduced entire, only after removing the ties. The filled-up case is a soft and sanitary mattress. The end of the case should remain open but for a stitch or two, so that the contents may be taken out on soiling the bed and renewed. A sheet should be placed over the mattress. A pillow may be made of clean dry straw in the same way.

Patients who cannot sit up should have their bed sheets replaced without being removed from bed. This can be done by rolling up the sheet lengthwise. Let the patient lie on one side. Roll the old bed sheet. Place the fresh one on its place on the unoccupied half. The patient should now be turned on the fresh sheet and the remainder of the bed may then be easily dealt with. If a water proof sheet or a napkin or draw sheet over it be needed, each of these may be included in the roller of the bed sheet in proper order and place.

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When a patient soils the bed almost continuously as in cholera, it is impossible to change beds. A bed can be improvised for such cases which is sanitary and will serve the purpose. A split bamboo frame is made of the length and width of a cot. Splinters of bamboo are placed side by side as near as possible and the surface is made as smooth as possible. These are fixed with thin jute ropes to bamboo battens underneath. In the middle the battens are joined to each other by a pair of strings passing up and down. The frame may now be placed on four bamboo posts sunk in the ground with recesses on the top to receive the battens of the frame.

A reed mattress is now laid on the bamboo frame. The patient is placed on the mattress. A piece of rag is placed under the gluteal region. Below this a piece of oil cloth may be conveniently placed. The evacuations pass through the rag placed under the gluteal region. The solids are arrested on the rag and the liquids drop into the oil cloth. Where there is no oil cloth the fluid drops into a vessel placed underneath. This vessel can be improvised out of a kerosene tin canister. The improvised receptacle made out of the canister is placed on the ground under the cot where liquids may flow into it. The rag is removed every time the patient passes stools and the place soiled in mattress wiped and disinfected by passing some hot water after removing the patient to one side. Hot water percolating through, disinfects the soiled portion of mattress and also that of the bamboo frame. The

BATHS, CLEANING AND MASSAGE

evacuations collected in the canister are removed and another can be placed in position. The excreta and the canister are treated with boiling water. The contents of which and the washings are buried and the disinfected canister brought back.

When the patient is removed to one side of the bed for cleaning the soiled portion, care is taken to put him there as comfortable as possible with a piece of rag under his hips as before.

Baths, Cleaning and Massage

Baths — Patients who are unable to walk out of the sick room must be bathed in bed. For this purpose water, towels and soap are brought to the bed side. A reed mattress and a blanket are placed over the bed on which the patient lies down. The face and neck are washed and rubbed first. When clean, the part is wiped with a dry cloth. The chest and the abdomen and the limbs are one by one bathed. The patient is turned on one side and the entire back is then cleaned and bathed.

Cleaning — When there is a thick deposit of dirt, a piece of moist rag is to be kept for sometime on the spot to soften and loosen it. The armpits and groins, the gluteal region and ankles have to be cleaned. Hairs under the armpits and on private parts are to be shaved off and soaped before the bath.

Hair is to be attended to. If there is too much dirt, only cleaning with soap water may not be enough.

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Where in males close cropping is not objected to by the patient, it may be done. If the hairs are infested with lice, kerosene mixed with a little turpentine is to be applied after drying the hair after the bath. The next day the lice will be dead and should be combed off. The eggs of lice may not die, so the operation has to be repeated at intervals when they are hatched till no eggs are left. Water bath or cold water sponging should be a routine course of nursing for patients. In special cases tepid water may be used in place of cold water. The temperature of water, whether it should be cold or at body temperature or tepid, should be determined by the condition of the patient. But a daily cleaning of the skin is of the utmost importance.

The teeth and nails are to be daily cleaned. The patient should be provided with a tooth stick of soft twig, the end of which is hammered so as to form a brush. The hammered portion should not be too long or it will bend on itself and fail to serve its purpose.

Where the patient cannot clean his mouth himself his teeth should be cleaned by the nurse. The index finger should be wrapped over with a little piece of rag, dipped in solution for mouth wash or in plain water or chalk powder and then should be used for rubbing the teeth. The tongue may be scrapped out with a split piece of twig. The dirt under the nails should be pushed out with a little pin-like stick. The fingers daily get dirty and should be soaped and

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washed daily in the morning in addition to the cleaning at the time of bath

The eyes are to be washed and any dirt from the corners of the eyes removed. The nostrils should be attended to and the interior wiped out

The mouth of the patient should be washed every time after a feeding by agitating water in the mouth and forcing it out and repeating it several times. If feeding is done at long intervals, then the mouth should be cleaned every 4 or 5 hours

Massage —The patient should be daily massaged. Massage should not be merely applying friction. It should be rubbing with firm grip on the limbs. On larger surface, massage should take the form of kneading or pressing down movement. Tapping on the muscles with closed fist is a good method. The vigour with which massage is conducted will depend upon the strength and muscular condition of the patient. It may be very vigorous in strong persons, very gentle, almost imperceptible pressure in cases of persons in a delicate condition of health.

Massage before bath will be invigorating. The patient will generally indicate what portions to massage with more or less pressure in order to obtain utmost comfort

Groundnut oil or cocoanut oil may be rubbed while massaging. This lubricates, cleans and also feeds the patient. For patients who are to be kept confined to bed almost on starvation diet, long continued massage of the body with liberal use of oil is a

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great help to recovery. The massaged oil sinks into the system through the pores of the skin and supplies food in a manner which nothing else can equal. In cases of typhoid, the patient has to be virtually starved for weeks. Copious oil massage means so much food given.

When the condition of the patient permits, he should be given fifteen minutes to half an hour's exposure to the morning sun. This may be adopted as a routine course of nursing. Exposure to sun involves removal of the patient from bed. Where the charpoy itself may be taken up with the patient and placed exposed to sun, it should be done. Where movement is harmful as in heart disease, in dysentery, typhoid etc the patient should be exposed undisturbed.

Temperature, Pulse and Respiration

Temperature :—In order to nurse a patient, general observations have to be made and proper idea of his physical condition has to be formed. Temperature, pulse and respiration give most important indications. Inflammation and infection raise temperature. Often the toxicity is directly proportioned to the temperature in a particular disease. In tuberculosis the rise of temperature will indicate how far the bacilli are actively operating. Each particular disease has a range of temperature indicating the condition of the system. Temperature therefore should be known and from its reading the condition of the patient

. TEMPERATURE, PULSE AND RESPIRATION

should be gauged It should always be remembered that temperature has special meaning with reference to each particular disease If in typhoid there is a morning temperature of 100°F only, it does not mean that it is a simple thing It conveys its own grave import and enables the nurse to gauge where the patient is in his struggle against the attack of the disease Temperature is a general measure of toxicity although it is not absolutely so and it is not relatively so as between one disease and another

Temperature is measured correctly by a thermometer But where a thermometer is not available a nurse should be able to judge about the temperature by putting his palm on the unexposed skin The accuracy of the finding of such temperature will depend upon the skill of the individual This skill is to be acquired by practice To prepare oneself for being a village nurse or doctor one should train oneself to judge about the temperature with the aid of a thermometer and also without it, so that even without the aid of a thermometer one may be able to express condition of heat of the body in terms of the thermometer degree Instead of merely saying that the temperature is subnormal, high or very high a nurse may say without the help of a thermometer that the temperature is approximately 101°F, 102°F or 105°F as the case may be

Pulse indicates the condition of the flow of blood, its volume and pressure It also indicates the number of times the heart is beating A use of

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temperature quickens the heart and raises the number of pulse beat. A lowering of temperature slows down the heart beat. The tips of our fingers are sensitive to touch and pressure. Pulse is felt by the finger tips, by pressing any superficially running artery, most conveniently the radial artery at the wrist. The hand of the patient is to be taken up and allowed to rest on bed or any other support, palm upwards and pressure put on the artery. The number of beats per minute is counted with the help of a watch having a second hand. As in the case of temperature, so in the case of pulse one may accustom oneself to judge about the number of beats per minute without the help of a watch. His own pulse rate being known, it may be easy for a nurse to find out comparative rapidity or slowness of the patient's pulse and arrive at an approximate figure about the number of beats per minute. Finding of pressure of flow is of no less importance than the finding of the number of beats. Pressure is found by the help of an instrument called sphygmometer. It is a costly instrument and all doctors do not have it. It is possible even without a sphygmometer to obtain very valuable information about the condition of the heart and the condition of the patient from a careful observation of the pressure of pulse. To feel the pulse accurately and to interpret the meaning of the observation is a very delicate art and cannot be taught through a book. Experience combined with guidance can only secure it for a would-be doctor or nurse.

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Pulse examination is made by placing three fingers of the right hand on the patient's radial artery. It is immaterial whether the observer places his fingers on the artery from above or from below encircling the wrist. In the former position the index finger of the observer is nearest to the elbow and in the latter position it is nearest to the hand of the patient. It is better to select the same position in all cases.

In determination of pressure the three fingers are so placed that each one may feel the pulse if others are not pressing. This ensures the feeling of the pulse by the middle finger on the pulse when the artery is being compressed both above and below the point, where the pulse is being felt. When the pressure above the middle finger is just sufficient to prevent the blood from lifting the finger during the beat, we gauge what is the maximum blood pressure. This is called the force of the pulse. Pressure felt during the pause of the beat is the minimum pressure or the tension. The difference between the maximum and minimum is the pulse pressure.

The sphygmometer gives reading of maximum pressure as also of the minimum pressure. The figures indicate pressure in millimetres of mercury. When it is said that blood pressure is 180 systolic and 110 diastolic, it means that the arterial blood pressure is so many millimetres of mercurial pressure.

Respiration observation informs the nurse about the rate of movement, rhythm and its type.

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Respiration is counted by placing the hand on the chest or the abdomen and counting its rise and fall per minute. Rhythm varies considerably and if the reading is taken consciously it may become irregular on that account only. It is therefore to be studied when the patient is off his guard or asleep. The inspiration and expiration may be unduly prolonged. Prolonged inspiration is associated with laryngeal or tracheal diseases and prolonged expiration is commonly associated with bronchial and pulmonary diseases.

A sort of rhythm in breathing is found in some heart diseases, apoplexy, sunstroke or uræmia in which successive respirations become gradually deeper and deeper till a maximum is attained and then fall off step by step till a complete stoppage of breathing occurs. The stoppage may last half a minute or much shorter after which there is another wave. This is Cheyne Stokes's respiration.

Observation of the movement will indicate the type of breathing also. If the breathing is mainly performed by the thorax it is thoracic breathing. If it is performed mainly by the abdomen it is abdominal breathing. In health, in the adult males and young children, type of respiration is abdomino-thoracic and the female type is thoracico-abdominal, or almost purely thoracic. The breathing becomes thoracic in cases of increased abdominal pressure or where the diaphragm is paralysed. Again when the intercostal muscles are paralysed or where there is inflammation

TEMPERATURE, PULSE AND RESPIRATION

or pain in the thorax, as in pleurisy, the breathing may become wholly of abdominal type.

In respiration, mere observation of rise and fall does not convey all the information. The expansion has got to be noted. In phthisis and pneumonia there is local deficiency of expansion at the affected areas and this gives a valuable indication of the location of centres of affection.

A Clinical Thermometer —Our body has got a normal temperature continuously present. This temperature is maintained by the circulation of blood, the heat being produced by taking food. Sometimes this body heat becomes abnormal on account of faulty diets or untoward external atmosphere or disturbance in the system.

The normal heat of a healthy adult is generally 97.6°F under the armpit in the tropics. If abnormal, it may rise to any degree upto 110°F. This is registered by an instrument called thermometer. It is a self registering instrument. Each degree is marked by a long line and divided into 5 equal parts, each part representing 2 points.

(2) The arrow mark at 98.4°F means normal temperature under the tongue. At one end of this instrument there is some mercury. Being heated under the armpit this is expanded and it rises through a very fine column indicating



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the temperature. There is also a specified time for which it is to be kept to get an actual index. It is written against the thermometer and care should be taken that it is not kept for any shorter time. This column of mercury indicating temperature does not fall back when the temperature is lowered but is sent back to the bulb by shaking. This is done by holding the stem in tight grip with the bulb downwards and a sharp jerk is given. This jerking down movement is to be repeated till the indicating column goes down. Before applying it to the patient, care should be taken to see that the armpit is dry and preferably without any hairs.

After each use, the thermometer should be washed with some antiseptic cold lotion. Hot water should never be used for the higher temperature will send the mercury column up and in its attempt to go further up than is room in the instrument, the expanded force of mercury will break the bulb automatically.

Temperature should be taken at the same hours each day, and should be taken as often as the case requires. In certain severe abnormal conditions external body temperature under the armpit may be very low, below 96°F but the internal heat (if it can be taken by the rectum or under the tongue) will register a high rise even upto 106°F or 107°F. It is generally found in cholera and is due to the absorption of poisons in the system.

TEMPERATURE, PULSE AND RESPIRATION

The temperature under the armpit may be classified as under,—

Normal		97° to 98° F.
Subnormal	below	97° F.
Collapse	,	95° F.
Febrile	above	98 4° F
Moderate fever		100° to 103° F
High fever		104° — 105° F
Hyperpyrexia	above	106° F

Very high and very low temperatures are dangerous. The temperature of children in normal health is about half a degree higher than that of adults.

Pulse —Pulse is the beating of the heart conveyed through the arteries. As the heart beats, so the arteries pulsate. Pulse is most conveniently felt at the wrist. But it may be felt wherever there is an artery near the surface. The number of beats per minute varies with age. The rate for the adult is 72 per minute. The pulse of the new born child beats 140 times a minute and gradually diminishes with advancing age.

Pulse rate at various ages

At birth	130 to 140	pulse beats per minute
,, 3rd year	100 — 120	„ „ „ „
,, 6th „	90 — 100	„ „ „ „
,, 7th—14th year	80 — 90	„ „ „ „
,, 15th—21st „	75 — 85	„ „ „ „
,, 21 years upwards	65 — 75	„ „ „ „
In old age	60 — 70	„ „ „ „

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Pulse rate varies with individuals. But if the pulse rate is higher or lower by 10 beats, then it will indicate something wrong.

In rapid pulse there is relatively shorter pause between the beats than in a slow pulse. When the beats vary in duration and in force the pulse is said to be irregular. When occasionally a beat is dropped altogether it is said to be an intermittent pulse.

The artery allows itself to be easily compressed or not according to the pressure of blood within. When there is high blood pressure the artery seems to be like a whipcord, and when the pressure is low it is felt as flabby. In typhoid, the artery can be easily compressed but in kidney diseases, when the heart is sending blood under full pressure the artery feels stiff.

When a large quantity of blood is pumped, the pulse is said to be large or full. When a small amount of blood enters the artery it is said to be small. The characteristics of pulse are also expressed by the use of terms "bounding, thready, collapsing, wiry, and flickering." These terms are self explanatory. A large and soft pulse with a little rapidity of beat, indicates premonitory stage to febrile diseases. In inflammation the pulse is rapid, hard and full. Disease of the heart is indicated by irregular, jerking or vibrating pulse. Indigestion and excitement, or too much drinking of tea and coffee may cause such pulse also. In rapidly exhausting diseases such as cholera, the pulse becomes thread-like.

PULSE-RESPIRATION-TEMPERATURE RATIO : STOOLS

Respiration :—To every four beats of pulse one breath is taken normally. But respiration rate varies with individuals as also in disease. If the rate is higher than 18 per minute in adults it will indicate some disorder of the lungs. If the respiration rate is lower it will indicate debility or loss of vital power or a nervous shock.

In a child the breathing is faster than in adults. A child of 2 years breathes 35 times per minute. A nine years old child breathes 18 times during sleep and 23 times while awake.

Breathing is more than ever necessary when the patient is unconscious. In such cases if the head is turned to one side, breathing is easier than if the person lies with the face up for the tongue then causes some obstruction.

Pulse-Respiration-Temperature Ratio —An increase of temperature by one degree above the normal corresponds to an increase of 10 beats of pulse and of two or three respirations per minute.

For example, taking normal pulse to be 72 and respiration to be 18, the rise of three degrees in temperature from $98^{\circ}4F$ to $101^{\circ}4F$ in an individual, will send up the pulse by 30 beats making it 102 and the respiration by 6 making it 24.

Stools and Urine

Stools —The nurse should acquaint himself with the character of excreta and understand their import.

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The following points should be attended to — Amount of daily stools, their colour, odour, consistence and form, and the presence of any abnormal ingredients. For any such examination the nurse should shed all disgust about the stuff and with a scientific enquirer's attitude handle the faeces. Faeces then will cease to be faeces to him but will be simply material for investigation and study. The association of faeces with something abhorrent repels all thought for closer examination. But this should be got over.

The amount of stools generally is 4 to 8 ounces per day according to the constitution of the individual and his diet. Instead of actually weighing, the nurse may note whether they are copious or scanty.

The colour of faeces is due to bile pigment, chlorophyl and other pigments. A normal vegetarian diet will yield pale yellow, golden or brown stools. Meat diet makes the stools darker and milk diet lighter. Black stools indicate the presence of blood unless the blackness is due to the administration of medicine containing bismuth or iron salts. In haemorrhage, high up in the intestine, the altered blood makes the stools black, tarry and very offensive. The blackness of blood may be distinguished from the blackness of medicine by mixing the stools with water and settling. If due to blood the supernatant liquid is tainted reddish otherwise it remains dark or greenish. Pale or whitish coloured stools indicate the absence of bile or obstruction of the entrance of bile in the intestine as in jaundice or to extreme dilution.

STOOLS AND URINE

of stools as in diarrhoea or cholera. The odour of stools is due to the chemicals, indol and skatol. The more meat is ingested, the more offensive the odour. Normal stools of vegetarians are comparatively free from offensive odour. In absence of bile, putrefaction takes place in the intestines and the odour is very offensive as in jaundice or in diarrhoea.

Consistence of stools is important. Normally it should be clay-like soft solid. Constipation makes stools hard and diarrhoea makes them thin and even watery. Slimy stools are due to the excess of mucus. In constipation, the stools get rounded like nodules which are frequently coated with mucus. Pressure in the abdomen due to dropsy or to tumour flattens out semisolid normal stools. A polypus may reveal its presence by leaving a groove or furrow mark on stools.

Abnormal ingredients when present may require detection after separation from normal formed stools. In such case the stools are mixed with water, broken up and stirred and then passed through a piece of cloth. Fluid and finely suspended matter passes through. For such examination only a small quantity need be taken. The residue may be thrown upon a dish and examined. Sometimes it is necessary to search for parasites, the hook worm or the head portion of a tape worm which is as small as a pin-head. In these cases the whole of the stools has to be mixed with water, broken up and strained and the residue examined. Round worms are large and can be easily

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detected without any preparation. Similarly the thread worms which come out in numbers may be easily detected. Examination will reveal the presence of gall stone also.

Stools are described according to their character. The stool of typhoid fever containing much bile is described as bilious stool. A special term "pea soup" stool is used for characteristic stool of typhoid. Similarly the watery stool of cholera is termed rice water stool. It is devoid of colour but slightly opaque like water which is thrown off after washing rice and has a peculiar fishy odour.

In severe dysentery and intestinal ulceration pus may be excreted and the stool is said to be purulent. The presence of mucus gives a slimy character to the stool.

Very often in bile deficiency soap comes out with stool. Soap appears in little greasy looking balls or as needles.

Urine :— Urine gives indication of condition of health and the nurse should know the characteristics of normal and abnormal urine and from it guess the state of health of the patient. The points that should be noted are the quantity, colour, consistence, odour, density and deposits.

Normally an adult passes about 50 ounces of urine in 24 hours but the quantity passed during the day is double or three times the quantity passed during night. The proportion works out as 100 : 25 to 60. If the night quantity increases it will indicate renal

STOOLS AND URINE

disturbance Children pass much more proportionately to their weight.

The following table gives the quantity of urine passed daily by children at different ages (Holt) —

Age	Quantity
First day	0 to 2 oz
2nd day	1/3 — 3 "
3 to 6 days	3 — 8 "
1 week to 2 months	5 — 13 "
2 to 6 months	7 — 16 "
6 months to 2 years	8 — 20 "
2 to 5 years	16 — 26 "
5 to 8 years	29 — 40 "
8 to 14 years	32 — 48 "

Urine is of straw colour normally If the quantity increases the colour becomes lighter. The colour gets darker as the quantity diminishes In disease the quantity is affected In diabetes the quantity increases so also in chronic renal diseases In diseases associated with increased arterial pressure and in hysteria, the quantity is increased It also increases by drinking more water and fluids

Urine diminishes in quantity when the arterial pressure is diminished in all fevers, in diarrhoea and vomiting and in excessive perspiration.

Freshly passed urine normally is quite transparent Various substances in suspension may give it an opalescent colour A little admixture of blood will cause the urine to look smoky Urine in health is

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quite watery in consistence. Urine is normally acid But alkaline urine containing pus may be quite ropy In renal disease the urine may set into a jelly

After standing for sometime the normal urine throws down deposit. This looks like a cloud at the bottom Phosphate, urate and free uric acid may be discovered in the deposit with the help of the eyes The deposit of phosphates dissolves on addition of acetic or citric acid or lemon juice. Pus is not dissolved by this treatment although deposits of pus and phosphates often occur together.

Concentrated or highly acid urine throws down a precipitate of urates. These are usually coloured by absorption of colouring material from the urine These deposits disappear on heating. Albumin if present is detected by heating for on heating albumin coagulates. When albumin and urates are mixed, slow heating will dissolve urates and then coagulate albumin.

Whenever there is a deposit, it will be wrong to conclude that something abnormal is being excreted If the urine is too acid uric acid is thrown down , if it is too alkaline phosphates are thrown down and these precipitates indicate nothing very wrong except the pronounced acidity or alkalinity of urine.

Passing of Stools and Urine.— For passing stools, in case of patients confined to bed, a slipper bed pan should be used. Where a bed pan is not procurable soft plantain leaves may be used. In between two layers of leaves a folded piece of rag or a thick pad

APPLICATION OF HEAT AND COLD

may be put and slid under buttocks If any liquid should escape tearing off the first leaf, it may be absorbed by the pad of rag underneath, while the piece of leaf beneath will protect the bed from being soiled In order to make the depression more prominent a piece of rag may be twisted into a rope and coiled round This coil should form the edge of the depression

For male patients a bottle with mouth or any other vessel may be used for receiving urine For females it is a difficult problem Either the patient is helped to sit up on the bed and urine received in any suitable vessel or the patient lies as for passing stools and urine is collected in the depression mentioned Where a bed pan can be used, these difficulties are avoided Where bed pan and urine bottle are used, they should be washed and cleaned with boiling water before using again The portion of the bed pan in contact with the skin should have a covering

Sputum or other excreta and washings from the mouth should be held in a spittoon or a bowl where some antiseptic such as thymol lotion is always kept The patient should not be allowed to spit here and there

Application of Heat and Cold

One of the most valuable methods in the hands of a nurse is the application of heat and cold in order

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to give relief to suffering and also in helping the system to come back to normal condition.

When the temperature is high, cold has to be applied in the shape of simply washing of the head or sponging increasing to wet pack or immersion in water. These are routine methods and the nurse must shed all fear in applying cold water to a patient's body. Ice, when available, is also an important article in fighting diseases. The effect of the ice bag on the head in diseases in which the central nervous system is affected is attended with great relief. In troublesome head symptoms of typhoid or meningitis nothing can equal the application of ice. The spine, specially the neck when subjected to cold from the ice bag responds quickly. In high fevers or in delirious state application of ice keeps the diseases considerably under control.

Similarly hot application is valuable in a variety of ways. In inflammation, rheumatism, neuralgic pains and in conditions of debility, warmth from outside in the shape of bath or hot water bottle is of very great utility. In wasting diseases and for emaciated persons in winter, hot water bottles kept round the bed under cover, give as if a new lease of life.

In diseases of the respiratory organs, heat applied in the form of poultice is very useful. This helps to minimise mischief going on within and relieves distress. If irritating oils are mixed with poultice, they penetrate and work as anodynes to the system. This

COLD SPONGING

brings relief and helps cure. Some modes of applying cold and heat are indicated. The nurse should be well qualified in the methods of application of heat and cold.

Cold Sponging — It is intended for cleaning the skin so that its action may be stimulated. It is also intended for cooling the body and bringing down the temperature.

Take a wet towel without wringing out much water from it. Pass it over the surface of a limb and then rub the limb with another towel soaked in water and wrung out. The first operation is for smearing the surface with water and the subsequent rubbing makes the skin clean and also helps evaporation of water and cooling. Take as much of a limb as possible and quickly finish that part and then take another limb. In this way sponge the whole body front and back. Then repeat the process till the desired effect of lowering of temperature and stimulation of the action of the skin are obtained.

Cold sponging may be given even to a weak patient when temperature is high. It is a daily routine operation for patients who cannot take a bath. After sponging, cover up the body with dry cloth and change the bed sheet which should be given for wash. At this time change the clothes also. The patient will feel refreshed. Apart from the normal daily sponge, a patient may require an occasional cold sponge for lowering the temperature as in the case of high fevers. The process is the same. It will

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depend upon the condition of the patient as to how long the sponging is to be continued. For lowering the temperature vigorous and prolonged sponging with liberal use of water is needed

Wet Pack — When it is desired to cool down the temperature more quickly than by sponging, wet pack is applied. Put a mattress over the patient's bed and a wet blanket or wet *kantha* over it. For this purpose soak a thin *kantha* in water and wring out water and then spread over the bed. Put the patient on the wet bed. Do not mind if he will feel uncomfortable. Replace the pillow by a wet roll.

Now cover up the patient with another blanket or two, soaked in water and wrung out. Keep the patient in this condition till the temperature comes down to the desired point

Cold Immersion.—It is a more drastic method than wet pack and is used when wet pack cannot be depended upon to bring down the temperature or a quicker lowering is necessary than can be accomplished by wet pack. Where a bath tub is available, bring it to the bed side. Put the patient in the tub, half filled with water. Add on water for complete immersion of the body. A suitable bath tub may not be available at most places. In such a case place the patient on a mattress over a charpoy. Place a wet sheet over the body and go on pouring water over this cover. Water will then spread over the body and keep it soaked with running water which will cool and bring down the temperature quickly. The patient with high

COLD IMMERSION WATER ON HEAD · ICE BAG

temperature feels very uncomfortable on cold immersion, shouts and cries in distress. But if the temperature has to be brought down, the operation is to be done thoroughly in spite of the protests. Sometimes the patient has to be forced to remain in position while water is poured.

Cold Water Current on Head — A patient may require a flow of cold water on his head to remove congestion of blood. The head is preferably shaved where possible. Over the pillow is put a piece of oil paper or plantain leaf arranged so that all water may sweep down to a basin below and not wet the bed.

After pouring water in a stream for sometime the wet parts are dried. The bed is examined and changed if soiled by water. The patient is then replaced in normal position.

For the same purpose of relieving congestion of blood in brain while the head is being cooled, the feet may be warmed so as to draw the circulation to them. This can be accomplished by putting hot water bottles about the feet or better by dipping the feet in hot water. The patient in this case is to be laid across the bed with the legs hanging down to reach the hot water tub below. In hot application always test the temperature of water by immersing your hand so that water may not be too hot and scald the patient.

Ice Bag — Take a block of ice and mark a line with a chisel or any heavy sharp edge along which it is to be cut. The line must be pretty deep. Now if any where in the line, the sharp edge of the chisel

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Fig. 113

Cold water current on
head

APPLICATION OF ICE BAG

is put and struck slowly with a mallet, a cleavage occurs and the marked portion breaks off. Ice is not cut but broken along a cleavage line put first.

The pieces of ice are to be washed free from adherent sawdust and wrapped loosely in an old towel and battered with a mallet. This powders the ice in little lumps suitable for the bag. A spoon may be used for filling the bag in order to protect the fingers of the operator. The bag is to be only three-fourths full. Space for air is to be left. The rubber sides are to be pressed flat on ice and the cap put on. Thus all extra air inside is excluded. Presence of air interferes with smooth contact of the bottom of the bag.

The head is to be shaved or cropped close for getting full benefit of the ice bag when applied on head. Hair is a non-conductor and prevents cold from penetrating fully. If the head is shaved, put a piece of cloth or lint between the rubber and the skin to prevent direct contact.

The ice bag is to be taken off when ice has melted. Where ice is to be applied continuously, an interval of few minutes should be given every hour in order to get best effect.

To make the application cooler than ice, some common salt may be mixed with it which lowers the temperature below that of ice.

After use and before storing away the ice bag, water is to be drained thoroughly and then it should be dried. Some sort of powder say, arrowroot should

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be dusted in the interior in order that the two surfaces of the rubber may not adhere to each other and break when next wanted for use

Cold Compress :—Several folds of old cloth are dipped in cold water and wrung out. In place of water any lotion such as alum or boric lotion as prescribed may be used. The folded piece is then put over the part indicated and covered with a piece of plantain leaf and bandaged. To be of value the compress should be changed frequently. Saturated solution of magnesium sulphate used as cold compress for erysipelas or cellulitis or sprain has been found to be very effective

Hot Pack :—Place the patient in a warm blanket. Sponge the front of the body with warm water (150° F). Take a sheet wrung out of boiling water and wrap the patient in it, tucking it round him. Then cover him with two more warm dry blankets. Hot water bottles should be placed at the feet and sides of the patient. Give hot drinks to encourage perspiration. Keep the patient thus for 20 minutes after perspiration has commenced. Dry the skin thoroughly with as little exposure as possible and place him between fresh warm dry blankets.

Hot Water Bottle —This is used to warm up patients and is a very necessary article of common use in the sick room. Patients suffering from cold, inanition and anaemia, tuberculous patients and undeveloped children often require to be warmed up artificially. Hot water bottles may be put round about the body or at special places to supply warmth.

HOT WATER BOTTLES

Several quart or pint bottles are to be selected and proper corks fitted on to them. Where a cork cannot be found, a wooden plug from the branch of any tree is to be made to fit the neck, wrapped with a piece of rag which will take the compression. The bottles are to be filled with water leaving some air space at the top. Never fill the bottles to the brim. If no air space will be left to receive the compression due to



Fig. 114

1 Right level of water, 2 Wrong level of water

the driving in of the plug, it may be eventually thrown off on account of excessive repellent pressure.

The plug is to be fastened down to the neck by a cap of rag which is to be wrapped round with a string. All these precautions are necessary, otherwise the cork may be forced off resulting in injury to patients. Hot

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water bottles should never be applied directly to the skin They should have a thin wrapping of cloth Rubber hot water bags are obtainable and are more convenient than bottles.

Foot Bath —This is a very useful method of heating the feet Hot water is filled in a basin. The patient sits on a stool and dips his feet in the water Water may be poured over the knee in this position so that from the knee downwards the entire leg may be kept hot The patient may be conveniently wrapped up for getting better effects from a foot bath.

Hot Sitz Bath —For relieving pain and congestion in the pelvic region due to inflammation of the uterus, ovaries, vagina or the bladder, hot sitz bath is very useful. Severe pain in menstrual period or in the period just preceding or following it, is greatly relieved by a hot sitz bath. It may be necessary to apply the bath several days in succession, two or three times or more often in a day. It also relieves pain in the hips The bath is applied by making the patient sit in a tub or an earthen-ware vessel, such as is used in feeding cows. In front there is a bucket to receive the legs Both the tub and the bucket are filled with hot water which can be well tolerated by the skin This is to be determined by dipping the hand in it and keeping it in water for a few seconds Just a dip and a withdrawal of hand from the hot water is no test of its temperature, which may be too hot for convenient use.

SITZ BATH HOT AND COLD IMMERSION

When the patient is receiving a sitz bath he should be wrapped up with a covering. After a sitz bath the hot parts should be rubbed quickly but lightly with a cold moist towel and then with a dry towel.



Fig 115
Sitz bath in a tub.



Fig 116
Sitz bath in an earthen-ware vessel

Alternate Hot and Cold Immersion — For any inflammation of hand and foot, for sores and ulcers in these parts, alternate application of hot and cold immersion has very great healing properties. For this purpose take two buckets one of very hot water and another of cold water. The diseased limbs or parts should be placed first into hot water for a minute and then withdrawn and placed just for a second or two in

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cold water This is to be alternated for thirty minutes This treatment repeated thrice daily for half an hour every time has wonderful efficacy in healing ulcers and infected open sores of any kind Hot water may be made more useful by previously boiling some neem leaves in it. It has also curative value for sprains and bruises

Fomentation.— It consists of applying moist heat to inflamed, painful or irritated parts, painful joints etc Coarse flannel or a strip of old blanket is useful for this purpose. Water is kept boiling in a large pan and a portion put into a basin near the patient The strip is dipped into hot water, the two ends being held in two hands It is then lifted out of water. An assistant passes a stick in the loop of the strip and twists and thereby wrings out water After being wrung out the steaming piece is applied to the part The heat becomes unbearable if applied all at once The strip is touched and taken up till the patient can bear it. When the heat is bearable, the piece is left there and as it is cooling down, another piece is put into water which is applied when ready and the cold one returned to hot water The temperature of water will fall by these dippings. More boiling water is added and the temperature is kept up. The treated part should be kept wrapped dry after fomentation.

Turpentine Stupe:— Turpentine is applied on the skin and also sprinkled on the strip of flannel used for fomentation. Other counter irritants may be used in place of turpentine.

APPLICATION OF POULTICE

Poultice — For applying moist heat, poultice is one of the most efficient methods. Poultice is best made out of linseed meal. Linseed is fried over a fire in a pan which makes it brittle. It is then pounded into rough powder. This powder is mixed with six times

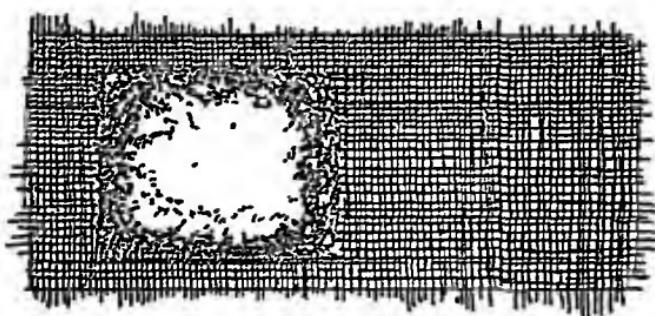


Fig 117.
Spreading poultice over half the area

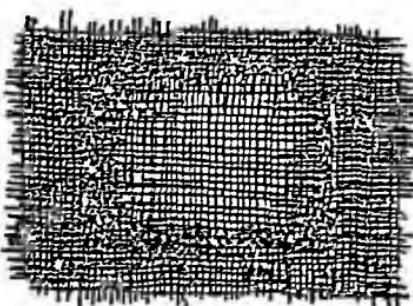


Fig 118
Finished poultice rag doubled over

its weight of water and put in a pan to boil. The mass thickens and the oil in the linseed prevents the mass sticking to the sides of the vessel. When the mass is cooked soft and becomes of the consistency of butter,

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it is taken down and spread over a piece of clean rag. The size of the poultice is determined first by measuring the length and breadth of the part where it is to be applied. A piece of clean rag is cut of double length and of the determined width over half of which the hot mass is put and the other half of the length is doubled over. The whole thing is put on the affected part and fixed up by a bandage.

It should be kept in site as long as it is hot and then taken off and replaced by a new one. Poultice is to be applied as hot as can be borne, care being taken not to burn the skin. Take off a poultice only when the next one is ready.

Flour can be used for making poultice in the same way. It is improved by an addition of some oil to it when it cooks better and the surface of the cloth also does not stick to the skin on account of its being moistened with oil.

The poultice may be made a counter irritant also by adding rubefacient oils to it such as turpentine, menthol or thymol dissolved in oils. It then works more efficiently than mere poultice in case of pneumonia and helps resolution of stagnant matter within the lungs. Addition of above oils can be conveniently made also for relieving pain with the help of poultice.

Hot Compress :— It is similar to cold compress. Water or lotion is used and a pad of cloth or of absorbent cotton folded in cloth is dipped in boiling lotion, wrung out and put on the affected part. This

HOT COMPRESS

operation is repeated by using two pads alternately, while one is applied the other is kept dipped in boiling water. When the part has become quite hot then the pad is left covered with a plantain leaf and bandaged. The reason for using plantain leaf is to stop evaporation of water. Once properly applied, the body heat keeps the moist pad warm for a



Fig 119

Absorbent cotton or a pad of cloth laid upon a bigger piece of cloth for wringing



Fig 120

Wringing out water from pad

considerable time. Fresh compresses may be given every 2 or 3 hours. Small pieces of pad are to be taken up from water by tongs, put over a spread piece of cloth and wrung out.

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**Application of Fluids in the form of Jet for
Washing out or Medication.**

Enema — When a fluid is injected into the rectum as a medicine or food it is called an enema

Douche. — When a jet of water is thrown out it is called a douche. A canister with an outlet which may be connected to a rubber tube ending in a nozzle is a douche-can. A douche-can is one of the simplest and at the same time most useful appliances. Simply a piece of rubber tube with a nozzle can be made to

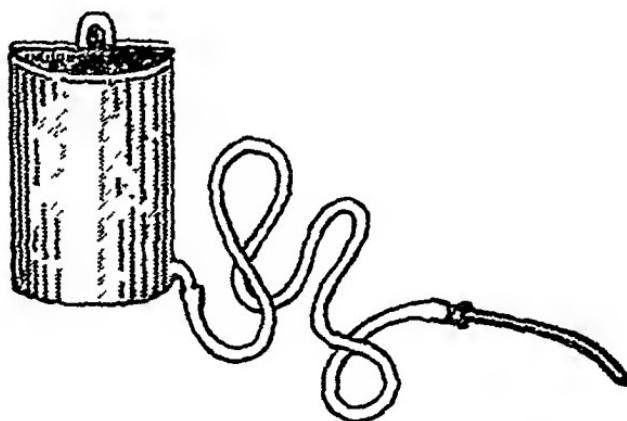


Fig. 121.
A douche-can with rubber tubing and nozzle

serve the purpose, dispensing with the can. In this case any pot or *lota* may be used in place of a can. The rubber tube is introduced into it from the mouth and can be emptied by syphon action as described under the stomach tube described hereafter. In fact the same piece of rubber tube may serve both the purposes. Only a nozzle with a cock has got to be used.

DOUCHE . NUTRIENT ENEMA

Nothing is so harmless, natural and convenient as a washing out of the colons by a douche. It is one of the most efficient methods of getting rid of toxins artificially in illness. There are various uses of the enema and the jet thrown out of a douche-can. They are described hereafter.

Enema —Enema may be used for (1) evacuation of the bowels, (2) to check diarrhoea or dysentery and (3) to nourish the patient. For this last purpose it is called a nutrient enema. There are various kinds of enema syringes or suction and force pumps by which the fluid is forced into the rectum. Their use may be discarded and only a douche-can be used for introducing large quantities of water or fluid. For small quantities a glass syringe is to be used. For purgation plain water or soap water at the body temperature should be used. The tube attached to the can should be fitted with a rectal nozzle and all air in it should be let out before introduction of the nozzle in the rectum. The can is to be raised about 2 or 3 ft above the level of bed and cock opened for letting out water. The height is to be regulated according to the obstruction met. Generally the slower the introduction, the longer will the fluid remain within the bowels and break up hard lumps of faeces. After introduction of water the tube should be withdrawn slowly and the anus kept plugged as long as is conveniently possible. For removing hard lumps from the anus which obstruct the flow of water through the nozzle a lubricated finger may have to be introduced and the lumps taken out.

In habitual constipation, washing out of the colons is desirable as also in cases of typhoid, dysentery and diarrhoea. In these cases a No 10 catheter should be sterilised by boiling in water and lubricated by smearing with some oil or soft paraffin and then attached to the end of the rectal nozzle of a douche-can. For children thinner catheters are to be used. The patient should lie on his left side and draw up his knees. The catheter is then introduced through the anus and pushed nearly its whole length and water very slowly let in by placing the douche-can at a convenient height. After the introduction of desired quantity of water the tube is to be slowly withdrawn and as in the previous case the water with the contents of the bowels allowed to come out after as long retention as possible.

Washing of the lower intestine is decidedly helpful in early cases of dysentery and typhoid. If the toxins produced there are washed out, it helps healing of the wounds quickly. In such cases introduction of the catheter and a very slow introduction of water are essential. Any force in the jet of water may injure the already thinned membrane of the intestine with grave consequences. If the eating away of the intestinal tube has advanced, then it may not be at all advisable to wash out in this way but to depend upon other methods of eliminating toxins as are indicated under the respective treatments.

Starch Enema — Enema to check diarrhoea consists in mixing the medicine with some astringent

ENEMAS RECTAL SALINE

in a medium of boiled starch A glass syringe is to be used for this purpose/ Catheter may be conveniently attached to the nozzle of the syringe and the fluid gradually introduced taking precautions about filling and introduction as indicated under purgative enema The process should be a slow one The liquid should not be shot in

Glycerine Enema —For children a slight irritation near about the anus may be necessary to expel lumps of hard stools blocking the passage, particularly during fevers For this purpose a little glycerine or honey mixed with equal volume of water or oil should be introduced through the rectum A special syringe with a bent ebonite nozzle is available for this purpose but a glass syringe will serve the purpose quite well

Nutrient Enema —When feeding cannot be done through the mouth or is not advisable to do so, rectal feeding is necessary For this purpose the bowels are washed out by a purgative enema and then the liquid food chosen, generally a solution of glucose, is slowly introduced through a glass syringe

Rectal Saline :—When saline solution cannot be introduced intravenously or subcutaneously or sufficiently in quantity by these routes, rectal injection with normal saline is adopted The injection is proceeded with as in the wash-out enema The introduction should be very slow Enema to kill thread worms consists in introducing saturated solution of common salt through a glass syringe at the

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rectum Here the liquid may be introduced with some force

Douching — Washing out a cavity with a jet of fluid is called douching. This is done with the help of a douche-can at the bottom of which is attached to a rubber tube ending in a cock and a nozzle. This is the same as described under purgative enema. The vaginal cavity is conveniently washed out with the help of the douche-can as also the uterus after delivery in special cases of sepsis. There is nothing special about it except the need of attachment of a spray nozzle to the ebonite cock attached to the rubber tube.

A douche-can is an article of frequent necessity for women both in health and in disease. The birth canal may be washed out with it using tepid water so that no discharge may accumulate. During menstrual period, application of warm water to the exterior genitals through a douche-can is very relieving. For relieving pelvic pain and congestion, a slightly higher temperature of water may be used. In leucorrhœa and other diseases it is necessary to wash out the organ and also to keep it aseptic. In such cases a very dilute solution of potash permanganate, just enough crystals being added to give a faint visible pink tint or a solution of copper sulphate of strength enough to give the water a faint blue tint, is very useful. The discharges cease to become foul, the sore surface gets better circulation of blood and heals quickly.

IRRIGATION OF EAR, NOSE AND EYE STOMACH TUBE

When menstrual flow is delayed warm water douche is helpful in inducing the flow if it is applied two or three times daily

Douching for Irrigation of Ear, Nose and Eye —
When these organs are to be irrigated in order to wash out any foul matter, a warm water douching is very effective. The warmth should be comfortably bearable and cold water should not be used for the ear for irrigation. The water may be borated or made antiseptic.

Stomach Tube —The stomach tube is a long piece of rubber tubing with one end rounded and

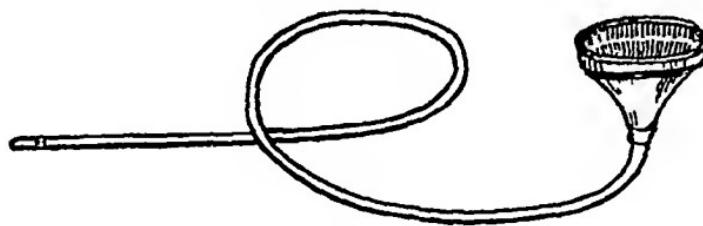


Fig 122
The stomach tube

perforated at several places and a funnel-like cup at the other end. The tube is sterilised by boiling and smeared with sterilised soft paraffin or olive oil or cocoanut oil. The patient has to open his mouth, if it is not possible to make him to do so by himself then use a piece of thick wood as a mouth opener by putting it in between his teeth. Ask the patient to swallow the perforated tube straight or carefully force it through the gullet till it reaches the bottom of the

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stomach. The stomach tube is generally used in cases of poisoning and it must be borne in mind that washing of the stomach by syphon action should be continued till the administered fluid returns clear.

A stomach tube may be improvised from an ordinary thin rubber tubing 3 to 4 ft. long and of about half an inch outer diameter. A few slots are made at one end—the stomach end. To the other

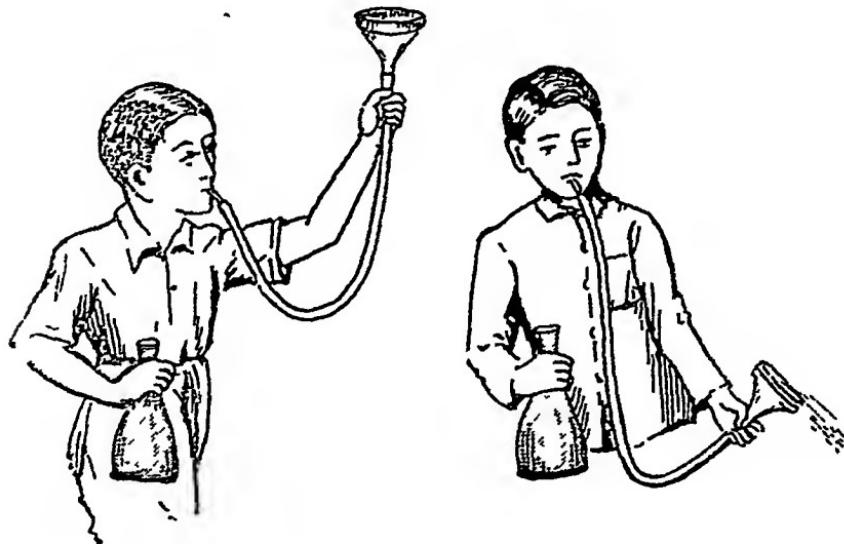


Fig. 123.

Filling the stomach by
stomach tube.

Fig. 124

Emptying the stomach by
syphon action.

end is attached a glass funnel. This completes the apparatus.

Before introducing a stomach tube into a patient's stomach, the operator should practise his hand by trying to fill and empty an ordinary bottle with the help of the tube. Put the bottle on a stool, pour enough

PAINTS, PLASTERS, LOTIONS, OINTMENTS ETC

liquid in the funnel to partly fill the bottle and while the falling column of water below the funnel is still visible, indicating that the tube at the moment is quite full, press the tube to stop the flow and quickly invert the funnel and lower it to reach below the level of the bottle. The fluid from the bottle then begins to flow into the basin kept below for receiving the emptied fluid. When the bottle is empty, refill it and empty it out as previously. When this is practised the operator may proceed with emptying the patient's stomach or wash it out.

Paints, Plasters, Lotions, Ointments, Dusting powders, Bed sore prevention

Paints — Medicines have to be applied on the skin or in cavities of the mouth and the nose in the form of paints. The commonest is tincture iodine paint. If there is a cut or swelling or if there is enlargement of the liver or of a gland, iodine has got to be used as a paint. For painting, a swab has got to be made. This is to be made out of a little round stick six inches long and of the diameter of a tooth pick. A slightly thicker stick is used for painting the throat, where the swab has to be large and the operation is to be done from some distance from the place of application.

Some prepared cotton is taken. It is advisable to prepare the cotton by boiling with soap and soda and then washing, drying, carding and sterilising it.

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Prepared cotton should be kept handy as there are many uses for it for the nurse. A little cotton is taken and spread out and held between the thumb and forefinger of the left hand. The end of the stick is placed against the cotton and held lightly pressed between the fingers. With the same two fingers of the right hand the stick is given a rotary motion. The cotton gets wrapped on to the stick. The fingers of the left hand are to be so manipulated that the cotton adheres in the thinnest film to the stick about half an inch away from the end and gradually increases in thickness towards the end, while beyond the stick cotton spreads out like an umbrella.

Once cotton has adhered to the stick more may be applied on it in the same way. For finishing, the end is held tight between the fingers and twist is given to the stick so as to overcome the pressure of the left hand and get the stem of the swab tightly wound round the stick. The formed swab should be pulled to see whether cotton adheres tightly. In the attempt bits of cotton may come out but the wrapping of cotton on the stem will not get loose. The stick end should be rough as the polished surface will not grip cotton fibres tightly. The stick should not be flat as then rotary motion cannot be given.

Swab should be made very thin and small in case of iodine. It should be squeezed against the neck of the phial and all superfluous iodine allowed to run back. The swab should be rubbed dry on the skin so that all the adherent iodine may be utilised.

PAINTS COUNTER IRRITANTS PLASTERS

For painting the throat a honey and iodine paint may be used It is useful in tonsillitis, pharyngitis and other affections This paint is made by mixing tincture iodine and honey in equal parts

Somewhat thicker paints are used for muscular pains, sprains etc The anodynes are datuia, aconite and camphor These are taken in equal parts and rubbed into a thick paste with aloes and water The quantity of aloes should be such as to give the required thickness If aloes is not available honey may be made the vehicle for the anodynes

Counter irritants may be used as paint or plaster in many cases Their uses are various and a nurse should know how to make and use them

Plasters —The commonest counter irritant is mustard There are several varieties from the sharpest rye to the blundest form of common mustard Rye or any variety of mustard approaching it should be used for the purpose Rye is powdered and sifted and kept in a bottle It does not keep long and should therefore be freshly prepared whenever possible The powder is made into paste with the smallest quantity of water and laid rather thick on a piece of cloth measured to the size of the area where it is to be applied The mustard side should be next to the skin The plaster after application causes irritation and it should be taken off when there is an intense burning sensation A plaster kept too long will form a blister In pain in the abdominal

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or thoracic regions such plasters give relief when other remedies may have failed

For muscular pains and sprains common chillies may be ground on a stone as for cooking and applied as a plaster on the required area. It should be kept moist and only so long as the patient can conveniently bear. In plaster like this as also in datura aconite plaster it is necessary to see that the coating remains moist. The effective portions are soluble in water and moist contact is therefore effective. Merely dry contact will be poor in efficiency.

Ointment :—Opium is a powerful anodyne. When it cannot be given internally nor can it be injected, then it can be used as a paint over the affected area. In pains of the thoracic region, in abdominal pains, in pain of appendicitis and in muscular pain, a paint of opium is equally applicable

For this purpose opium is made into paste with equal part of water and the whole is incorporated in soft paraffin equal to 10 times the weight of opium. For making $\frac{1}{2}$ oz of the product, use

Opium	24 grains
Water	24 minims
Soft paraffin ad	$\frac{1}{2}$ oz

The above will be an ointment. If instead of soft paraffin glycerine or honey is used it will be a paint. For application into the cavity of the ear it can be made with oil in place of soft paraffin.

SOME COMMON LOTIONS

Lotions —Boric, Iodine etc. Lotions are liquid preparations intended for a wide range of application. They are applied to the surface by cotton wool soaked in them or dropped or injected.

Some of the Common and Useful Lotions and their Compositions

Lotions	Composition grains per ounce of water	
Boric lotion for the eyes and compresses	Boric acid	16 grs
Boro-zinc lotion for the eyes	Boric acid	8 ,,
Zinc sulphate	1 ,,	
Picric lotion for burns where it gives immediate relief, an antiseptic used also for dressing wounds.	Picric acid	1 ,,
Silver nitrate lotion for eyes, stomatitis and wounds	Silver nitrate	15 ,,
Copper sulphate lotion for washing eyes, wounds, ulcers and female genitals	Copper sulph	2-4 ,,
Iodine lotion for disinfection and sterilising	Tinct iodine	10 minims
Boro thymol alkali lotion for the mouth, nose and ear wash and alkaline skin wash		

Dusting Powders —Dusting powders have their use in antiseptic dressing and in keeping the skin

NURSING

sweet and free from clamminess. Arrowroot is an excellent material Arrowroot should be kept exposed to sun for several hours to make it free of moisture and with it should be mixed boric acid $\frac{1}{2}$ dram per ounce. Such powder can be dusted on infants and sick persons' skin after bath and for keeping joints and creases lubricated.

Bed Sores — Patients long confined to bed, emaciated and without vitality develop bed sores. Paralytic patients not properly nursed develop bed sores on account of the back often remaining wet from urine dribbling or from carelessness to clean after passing of stools. In emaciated patients the skin over the bony prominences is mostly affected. Lower part of the spine, the hips, heels, ankles, shoulders, elbows and back of the hand where the skin is directly over the bones without a padding of tissues underneath, develop bed sores. The part becomes red and then the surface of the skin becomes broken and a sore is formed. Very serious ulcers may develop out of these sores. They sometimes appear with surprising quickness. Once they form, it is difficult to heal them or check them. The real thing is prevention.

The attendant should be on the look out. The patient's position should be changed several times during day and night and the skin should be kept scrupulously clean.

At first methylated spirit should be smeared on the affected parts. Arrowroot mixed with boric acid 30-60

BED SORES REMOVAL OF CONGESTION

grains per ounce should then be dusted freely on places of contact When redness is seen on the skin, pads should be used as far as possible to keep off pressure on the part involved

The patient suffers great distress on the formation of bed sores and it is up to the nurse or attendant to see that bed sores do not form

Removal of Congestion

In certain diseases the organs get congested This congestion has to be removed Congestion may occur in the liver or in the kidneys and their normal functions may be disturbed thereby Blood pressure may rise and because of high pressure it may affect the nerve centres and therefore affect the whole system A removal of congestion will be here conducive to the general well-being

Bleeding is a recognised method of removing congestion Pricking the nasal mucous membrane is one of the ways This is seen performed by many people One has to learn the trick Needle like jaw of some fishes with prickly teeth is used for this purpose The jaw bone may be made sterile by drying and then keeping soaked in iodine solution The needle-like bone is then introduced into the nose and the membrane pricked Blood begins to fall in drops It stops by coagulation Then another scratch is to be given to bring down more blood

Other methods of removing congestion are cupping and application of leeches These are of utility in

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relieving local congestion. When the liver gets congested or there is a swelling and inflammation on a muscle, blood cannot be let out by bleeding directly. It has to be taken out through some appliances. Leeches are very useful here. Leeches may be put on the surface of the liver for liver congestion and on the forehead for headache and brain symptoms and on muscles wherever needed.

Another method of removing congestion is by cupping. It is specially useful in exciting the kidneys to action and in withdrawing congested milk from the breasts.

Leeches.—These are used to remove small quantities of blood locally. Before applying leeches, the part should be well washed with hot water and dried. To apply a leech, hold it by its larger end in the folds of a cloth or with a pair of forceps, the teeth of which have been padded and allow the smaller end or head to be directed over the skin of the affected region. When the head has taken hold of the body it may be released. The leech will adhere to the skin by its sucker.

Sometimes it is difficult to get the leech to bite. In such cases a drop of milk or some sugar may be applied over the area where the leech has to bite or the skin may be scratched slightly.

The leech should be allowed to drop off when it has sucked its full. It should not be dragged off. In case it is necessary to remove the leech prior to dropping off of its own accord, some salt or a little

LEECHES CUPPING

concentrated saline solution may be applied on the head of the leech and it will fall off immediately After removing the leech, the part should be well washed with tepid water, touched with iodine and bandaged if necessary Generally leech-bite bleeding stops naturally If it does not, a little alum lotion or alum powder may be applied to the bleeding point and local pressure maintained This will stop the bleeding in no time

Bleeding from the same point may be further accomplished by hot fomentation over the part When it would be necessary to use the same leech over again a little common salt may be put over the head of the leech and it will very readily vomit out all blood and become ready for another suction.

Cupping —Cupping is a method of abstracting blood or other fluid locally. It is mostly used to reduce the congestion of the kidneys and the breasts

Cleanse the area to be cupped with a dry cotton pad and apply a little vaseline or oil Put a little cotton or a little blotting paper just soaked in methylated spirit at the bottom of the cupping glass, moisten the glass with spirit and withdraw the cotton

Then light the spirit adhering to the surface with a match stick When the spirit is lighted turn the cup immediately with face downwards and apply over the required part or area It should be carefully done that no burning spirit drops down while applying the cup The flame inside will immediately extinguish

NURSING

and the skin will be considerably drawn into the glass forming a swelling. Keep the cup in position, sucking for at least 20 minutes and then remove. Too much spirit should not be used on the paper or cotton.

To remove the cup never try to draw out the glass as a whole. Raise one edge by firmly depressing the skin with the left thumb and holding the glass slanted with another. As soon as some air gains admittance inside, the cup can be easily removed. When cupping for a second time is required it should not be done over the same place but a little away from it. Hot fomentations may be applied over a cupped area as many times as may be required.



Fig. 125.

An ordinary small glass with thick edge may be used for cupping

Injection

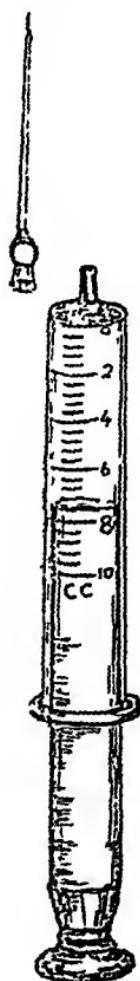
Injection is the introduction of fluids into the system. We have already seen the utility of introduction of water jet into the rectum or of food or medicine through the rectum. But another method of introducing liquid in the shape of medicine in the system, is by forcing it under the skin or in the muscles or in a vein.

These methods of injections are very useful and often may save life when nothing else remains to be done.

HYPODERMIC INJECTION SYRINGES

for a patient In most cases the purpose of injection is to obtain a speedy effect. This method has obvious advantages in the case of patients who are unconscious

and collapsed and cannot swallow medicine or in patients in whom administration by the mouth is impossible on account of gastric disorders or patients who refuse to take medicine by the mouth



The process is simple and is described here in the hope that the nurse will try to learn and apply the art Compounders do this work at many places A home doctor should know it to qualify himself

Hypodermic Injection —By this is meant administration of drugs directly into the body through the skin with the help of a hollow needle fitted on the head of a strong syringe made of all glass or glass and metal. There are many varieties of syringes and of different measures or capacity used for this purpose

Fig. 126
A 10 c.c. syringe
and a needle
are 1 or $1/10$ c.c. each in 2 c.c. and 2 or $1/5$ c.c.
in 10 c.c. syringe.

The graduations of the syringe indicate cubic centimetres (c.c.) by numerical figures and the divisions

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There are different routes of administering drugs by injection These are :—

- 1 Subcutaneous injection
- 2 Intramuscular „
- 3 Intravenous „
4. Intradermal „

Before an injection the site selected should be sterilised by rubbing the skin with tinct. iodine. Do not use water for this purpose. Even if there is scum or dirt, cleaning with iodine is safer and better than to attempt to wash dirt off and clean.

Sterilise the syringe and the needle by boiling in water. Fit the needle to the syringe. See that the needle is sharp and true and the bore clear. Now fill the syringe with the fluid to be injected. If it is an ampoule, cut or break off the end of the ampoule holding it slightly inclined down so that specks of broken glass may not get inside the ampoule. Introduce the needle of the syringe into the ampoule held with mouth slightly pointing downwards and slowly suck in the contents by pulling the piston. The ampoule may be gradually inverted in the process without allowing a drop to fall off. The filled syringe is now ready for an injection. No air should be drawn in and to ensure this, push the piston till a drop of fluid trickles and hold the needle downwards.

1. Subcutaneous Injection :—The sterilised skin is held between the fingers of the left hand, the thumb pointing to you. Lift up the skin. It will form a

METHODS OF INJECTIONS

D-shaped elevation Hold the syringe between the fingers of the right hand, the piston coming within the hollow of the palm and almost touching but not quite touching the palm In this position push in the filled needle of the syringe with the force of the fingers taking care that the piston is not touched

When the needle is well driven home under the skin, push the piston by the palm This will cause the piston to get in and the liquid will be squirted out through the needle into the tissues under the skin

Withdraw the needle and stop bleeding by pressure of a piece of sterile cotton with a tinge of iodine in it

2 Intramuscular Injection —For intramuscular injection the arm is laid on the palm of the left hand below the point of injection The skin of the arm is stretched by the pull of the left hand gripping it from below Then the needle should be inserted through the skin a little slantingly upto at least an inch depth in a muscular area Fatty robust men have a thick layer of fat under the skin Care must be taken that the needle is passed well off the fat into the muscle Usual sites are the upper part of the arm just below the shoulder and the buttocks, where massive muscles are present without any important nerves and blood vessels. Care should be taken not to insert the needle too deep to reach the bony area and not too little to inject the drug into fat

Quinine or cinchona is injected intramuscularly. If a drop of this will get under the skin while the needle is being pushed, it may cause suppuration and a nasty deep sore may develop. Utmost care should be taken to see that the piston is not touched during the penetration of the needle and also that no drop is oozing out of the needle when it is being introduced. The needle end must be quite dry.

3. Intravenous Injection :—Injection of drug directly into the vein can be achieved by two methods (a) direct method and (b) venesection method (a) Direct method—Superficial veins of the elbow are the best for the purpose. Grip by encircling the limb with a rubber tube 2 inches above the point of injection and by gentle massage send some blood upwards. By this, the veins will become gorged and thicker by accumulation of blood. Ask some one to keep the tube gripped tight and now as your both hands are free hold with one the vein in position and the syringe in another. Then maintaining an angle of not more than 20° with the skin, slantingly insert the needle into the vein parallel to it. As soon as the needle is inside the vein, some venous blood will gush in immediately into the syringe through the needle. Remove the tie as soon as there is blood in the syringe and very gently push the solution into the vein. When the whole contents have been injected, press with the left index finger the point of injection and sharply draw the needle out. After having pulled the syringe out maintain the pressure at the point of

METHODS OF INJECTIONS

insertion for a minute or two and then leave it. In case blood still oozes out, keep a cotton moistened with tincture iodine pressed for sometime long, which may be done by the patient himself if he is not in a senseless condition.

It may not be possible to correctly inject by only reading about the method. To be successful in the process, one must first see the process of injection and learn from a trained man and then try oneself several times with confidence. A novice may attempt to put some normal saline into a healthy person's vein and thereby learn. Students can practise injection on each other.

(b) The venesection method — It is done by exposing the vein by a section through the skin.

Put a very fine incision mark on the skin, exactly along the required vein sufficient to denote a line. Then raise this skin (only the skin) with the help of the index finger and the thumb of the left hand and incise the skin carefully. When the skin is cut through, leave it and a blue coloured tube will be exposed. This is the vein. Now carefully hold the vein and insert the needle inside and push the solution in.

Of the two intravenous routes, the direct method is decidedly the better and there is little chance of sepsis. This has to be learnt with patience.

4. **Intradermal injection** is the injection of a solution just below the skin. Previously very thin needles were used for the purpose and utmost care had to be taken not to go deeper than the skin. But the

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invention of the intradermal needles has solved the problem. These are short needles of sufficient length to perforate the skin only and no deeper. Intradermal injection is given to the extent of 2 to 3 minims at a place which will be indicated by the appearance of a pimple just above the skin.

Injection Medicines used in the Book and Their Usual Routes

Subcutaneous	Intra-muscular	Intra-venous	Intra-dermal
Atropine Sulphate	Bismuth	Calcium chloride	Chaulmugra oil
Caffeine Soda Benzoate	salicylate	Iodine	Saline
Caffeine Soda Salicylate	Chaulmugra oil	Potass antimony	
Camphor in oil	Cinchona	tartrate	
Digitalin	Emetine	Saline	
Emetine Hydrochlor	hydrochlor		
Ephedrine Hydrochlor	Mercury		
Morphine Hydrochlor	cream		
Strychnine Hydrochlor	Quinine bi-hydrochlor		

Saline Infusion :—Saline injection is required in urgent cases to repair and replace the loss of fluid from the body by bleeding, as a result of injury or bleeding after child birth or bleeding in diseases and by purging in cholera, bacillary dysentery etc. There are generally 3 methods of administration of saline, namely, intravenous, subcutaneous and rectal.

The appliances illustrated below are generally required for saline infusion.

Needle for subcutaneous injection of saline, graduated saline bulb of one pint capacity with rubber

SALINE INFUSION A SALINE BULB

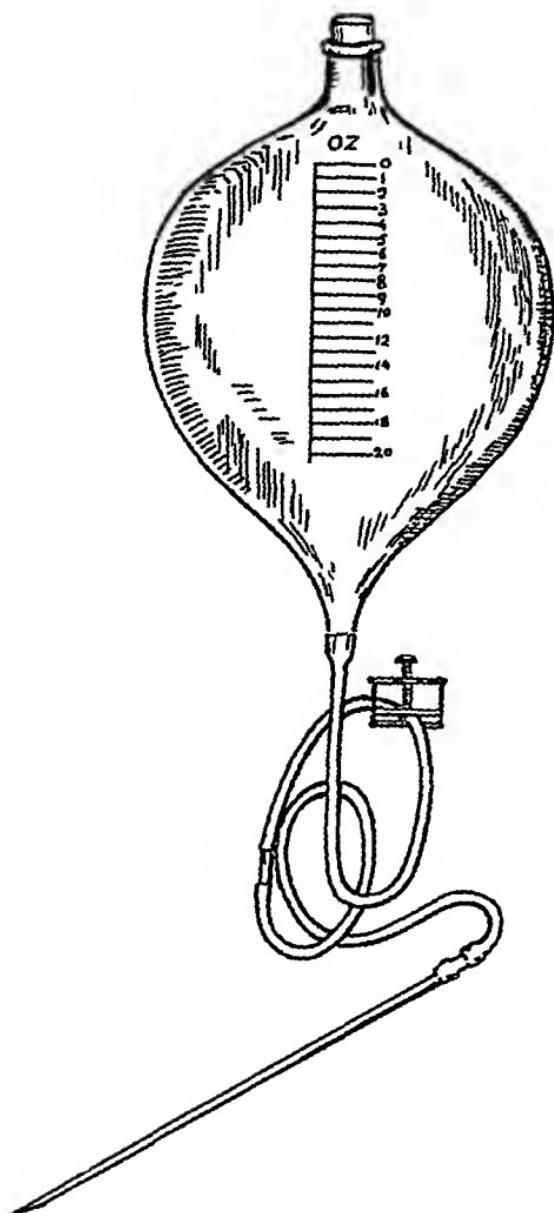


Fig 127

A graduated saline bulb with rubber tubing and a subcutaneous needle

tube at least 5 feet long, double channelled intravenous needle, some cotton, iodine, methylated spirit, hypodermic syringe and three quart bottles of saline filled ready. They should all be of equal strength and quality.

Lay the patient flat on his back on the bed. Expose the arm. Bind a rubber tie or a bandage round the upper arm to find out the vein. Sterilise the skin with iodine. Fill the saline bulb and have it held up close by and at some height. The infusion needle has a two ways cock. In one position of

the cock there is communication between the bulb and the needle. When this is opened, saline flows out from the needle. In the other position the needle communicates with a stub of a tube attached to the socket of cock. The needle is introduced into the vein with the cock in communication with open tube. As soon as the needle gets inside the vein blood flows out through the open end. If blood will not flow, it is concluded that the needle has not got into the vein. Try till blood comes out. Take off the rubber band and turn the

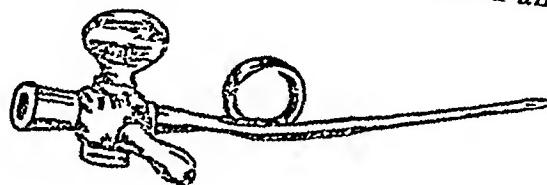


Fig. 128.
A direct intravenous needle

cock communicating the needle with the bulb. Saline solution will then flow in. Go on giving saline till the desired quantity has been infused.

Subcutaneous method is the same as described elsewhere; but in saline infusion subcutaneous needle is a large and strong one and is directly attached by the tube to the saline reservoir.

Disposal of Excreta

Disposal of excreta is a matter of great importance in sanitation as well as in nursing. In villages it is a common sight to see children passing stools anywhere

DISPOSAL OF EXCRETA

in the yard. The stools are allowed to lie indefinitely no matter whether the children are suffering from diarrhoea dysentery or any other diseases. This custom helps to spread infection and lowers the sanitary standard of living.

When a person is laid up in bed on account of illness, little provision is made for him to pass stools or urine. In most cases the patient however weak, is taken somewhere to a corner and allowed to ease. The patient will oppose all suggestion of easing in bed even when it may be positively risky for him to sit up, not to speak of walking. The excreta of such sick persons are not disposed of properly. They are somehow kept covered with a sprinkling of earth or thrown indiscriminately some distances away and left to rot and be sought after by flies.

A privy, set up in the manner indicated in chapter IV, should be used by sick persons. When the common privy is some distance away and the patient is weak, a little space should be screened and a trench dug as near as possible to the sick room. Nearness of a privy to rooms used for the sick or for household purposes will be nothing wrong provided the excreta are covered up properly.

When the patient has to pass stools and urine in bed, these should be immediately put under earth. The bed pan used should be washed with boiling water, drained and left in the sun. Clothes soiled with excreta should be taken to the trench first and solids removed and locally washed. The pieces are to be then boiled in

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soap and soda solution, washed and exposed to sun Care should be taken to see that the washings do not drain away to pollute water courses. They should be allowed to accumulate in a covered pit and allowed to be absorbed under earth.

Disinfection and Sterilisation

While nursing, occasion arises to disinfect different articles and also sterilise things. The commonest way of disinfection is to boil the objects in water. Boiling water kills microbes Sun's rays have powerful effect not only in disinfecting but in deodorising also Patients' clothes even if boiled in water do not readily part with a peculiar smell if they are once soiled by mere boiling Exposure to sun in such cases serves the purpose Clothes, beddings and sheets on exposure to direct sun's rays become sweet and shed all foul odour which cannot be got rid of by mere boiling.

For metallic objects particularly needles, exposure to the flame from a match stick is often quite good. Of equal utility is iodine If water be tinted with iodine so that the peculiar odour of iodine is obtained, then it is fit for sterilising all possible objects.

Diet, Drink and Feeding

Diet

During sickness the digestive system shares the general weakness even if the sickness is not directly of the abdominal organs. At any sign of

DIETS FOR INVALIDS

approaching illness food should be curtailed or abstained from. Animals have this instinct. In domestic animals, most often, the sign of illness is their refusal to take food. Men have lost that instinct and the artificial call of hunger disturbs sick persons making them crave for food and thereby bring in much unnecessary suffering.

In those diseases in which the attack is likely to last for a week or so, abstention from food can do no harm, on the contrary, do a great deal of good and cut short the period of suffering. In those diseases in which the patient is to be kept confined to bed for 4 or 6 weeks as in typhoid, the strength of the patient has to be maintained consistently with the digestive capacity of the organs.

In all acute illness liquid diet should be the general rule. Soft food may be given to invalids and convalescents in the nature of ordinary starchy foods, cooked or prepared softer than is normally taken. Rice and rice products like *chura* or beaten rice, *muri* or fried puffed rice should be specially prepared for the sick room. Rice boiled with three times its weight of water in a cooker for about an hour generally gives a very soft and digestible product. The water in which rice is boiled should be of such as to be completely absorbed within the mass. Where there is the risk of taxing the stomach by the use of fresh rice, old rice may be used in which probably the proportion of proteins is diminished thus making the food lighter.

Chura is beaten rice which preserves the outer nutritious coating containing the vitamins and mineral salts. It is washed with the slightest quantity of water and then kept soaked in water for sometime. The flattened grains get swelled, rounded and soft. This can be very conveniently used as a nutritious and light diet for invalids. It can be sweetened or soured to taste or mixed with dahi or vegetables suitable for invalids. Muri is another preparation of rice. It is a fried product devoid of the outer coating and can be regarded as partially dextrinised starch. On account of its being dextrinised it is easily digestible. But the method of its preparation involves use of sand and lots of sand get lodged in the fried grains. Muri may be washed free from sand and then taken as an invalid food.

Khai (Sans-lay) or Fried Paddy :—When paddy is fried on a sand bath the dextrinised grains are squirted out. The heat of the sand bath first softens the interior of the grain. The casing of husk resists expansion due to heating. The pressure in the interior increases after a time to such an extent that the casing of the husk bursts and the grain so frayed, flattened and then curved by explosion, is thrown out. Khai, as it comes out of the sand bath contains a lot of sand and husk mixed with it and has to be cleaned free from them. A second and careful cleaning is necessary in order to make it fit for the table. It is a very light, easily digestible starchy food more advanced in the process of dextrinisation than chura.

DIETS FOR INVALIDS

or muri Khai, if soaked in milk almost melts and becomes a fit diet for invalids

Atta —If dough is made from atta and kept for a few hours in a warm place a little raising takes place Roti or bread made from such atta is good for invalids Puri or loochi is atta, prepared first like roti but instead of cooking it over a heated plate and then on direct fire, it is cooked by throwing the disc in very hot ghee This frying with ghee kills all vitamins and renders the product much less digestible It is distinctly an inferior article of diet as compared with roti Millets may be made into roti These form nutritious invalid diet The husk remaining with the grain, gives it a superior character about digestibility and imparts a mild aperient property to it forming a sort of roughage But none of these or similarly cooked starchy food is suitable for persons suffering from acute febrile diseases or diseases of the digestive system

During fevers and diseases of the digestive system starchy food should be in a fluid form, the thinner the more acute the disease

Sago —Sago cooked with water may be made of any consistency During febrile condition it is to be cooked very thin and as the patient recovers it may be served thicker It may be mixed with milk Milk mixed with sago or barley is a better and more digestible article than milk alone The requisite quantity of milk to be given during the day, may every time be mixed with a portion of sago water When

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the patient feels hungry in convalescence, sago may be made thicker by stages up to the consistency of soft cooked rice.

Barley :—Barley is a useful material for drink for patients who need not be given any food, but whose false hunger must be satisfied with something. One *tola* of barley boiled in a pound of water makes palatable and soothing drink mixed with lemon, sugar or salt to taste. Milk, where given, may be mixed with barley water. Sago, barley etc require fifteen minutes' boiling in water for bursting of the starch cells. This should be thoroughly done.

Milk served tepid is both refreshing and strength-giving. Ordinarily a pound of milk and a few tolas of sago in 24 hours ought to be enough to maintain a patient through protracted illness. Milk as such is less digestible than dahi. Dahi contains some friendly bacteria. The introduction of dahi into the system changes the bacterial condition for the better. Dahi therefore is to be given to a patient whenever possible and when the patient can tolerate it. There are rare cases when dahi is not tolerated. Dahi cannot be served hot. By heating, the bacteria which give to dahi its particular value are destroyed. In diseases of the pharynx and larynx where application of heat is health-giving, cold dahi may not be liked by a patient. But in all other cases dahi should find the place of preference. It should be thinned down and beaten up with water to give it fluidity and make it suitable as a drink.

DIETS FOR INVALIDS • A CHURN

Persons suffering from liver disorders cannot tolerate fat in any form. It should not be given to them. If therefore milk or dahi is given to such patient, fat should be separated out from it by beating with a separator. For separating milk it is to be brought to boil and then cooled. The cooler it will be made, the greater will be the separation of butter and quicker too. Dahi has simply to be agitated with a beater or churn to get it separated. A home-made separator or beater or churn is a very simple apparatus. A piece of bamboo about an inch or an inch and a half in diameter is split at the end and the split separated ends kept widened out into a circle by pushing a round wedge in and stringing the pieces with a thin ring in the middle. The churn takes the appearance as shown in the illustration.

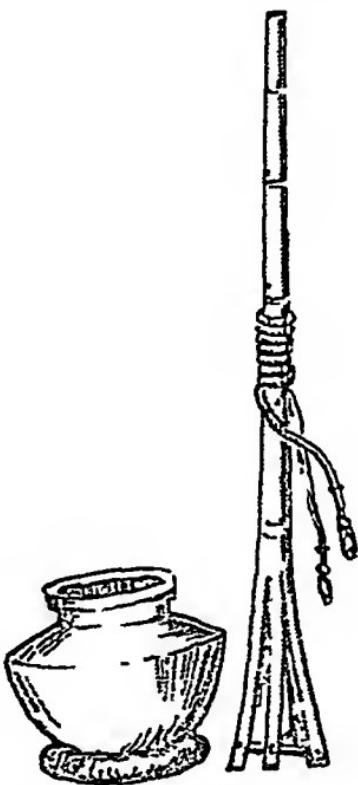


Fig 128 An earthen-ware vessel and a churn

A firmly fixed long post is chosen and rings made from cane or from twigs of bamboo branches are made and tied to the post. The churn is now passed through the two rings and allowed to drop into the vessel containing milk.

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or dahi. A small square tin can be used as a receptacle for the fluid to be churned. This container should be only one third full so that the liquid may not be squirted out during churning. A rope is then passed round the bamboo churner in between the two rings and drawn to and away alternately by pulling with the two hands. Churning takes place and fat is quickly separated from the fluid. The liquid is known as buttermilk.

Whey.—When a patient cannot tolerate fat and also proteins as in typhoid, he may be given milk devoid of both but containing the sugar of milk and the vitamins. This is one of the most harmless diets. To prepare this, milk is put over a fire on a brass or an aluminium pan. When it is come to boil a few drops of acid liquor are poured into it. Acid liquor may be supplied in the form of juice of lemons. Alum which is acid in character is also a suitable substance for separation of proteins and fats. Alum is powdered and kept in a bottle and water is poured over. The bottle is shaken. Some alum will still remain undissolved. If all is dissolved put some more alum in it. This will form a stock solution. A few drops of this solution will be enough to separate a pound of milk on being heated. Alum water is added very gradually and the effect watched. After a time the milk will exhibit tendency to separate. A little more boiling or a fresh drop of alum will complete the process when milk will suddenly separate out into a clear greenish tinted liquid. It is to be strained.

DIETS FOR INVALIDS

through a cloth. The same piece of cloth can be reused only if it is washed thoroughly, boiled in water and sun dried. Otherwise if the straining cloth used for milk or milk products is kept simply washed with a little water, microbes are sure to develop and make further use of the piece insanitary and dangerous. It should be remembered that milk or cotton fibres having milk in a moist state are very favourable for the growth of micro-organisms. Whey is a drink having great sustaining properties and should be given to patients who are to be kept on starvation diet for a long period.

Chhana —The solid left on separation of milk by alum or lemon is called chhana. It is a concentrated food containing butter and milk proteins. When invalids are to be given concentrated sustaining food, chhana comes in as very handy. When patients suffering from tuberculosis cannot take all the milk they require, it may be given altered in this form. Chhana is to be used as solid food and whey for the drink. The whole of the quantity of milk can thus be taken.

Vegetables —Vegetables properly cooked should be given to invalids or persons suffering from chronic diseases in which the digestive system has yet strength to cope with vegetables. Green leaves simply steamed or boiled and taken with water or cooked along with rice may form a valuable diet. Tender tops of pot-herbs come under this heading. Roots are generally full of starches and have not

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much value as vegetables and cannot serve the purpose of vegetables in the proper sense

Raw leaves ground to paste with or without water in very small doses if tolerated will be of great service in supplying the vitamins and mineral salts which invalids require more urgently than healthy persons. Vegetables have the property of exciting the secretion of bile and therefore of assisting digestion For persons suffering from febrile or other acute diseases, cooked vegetables are unsuitable.

Fruits —Fruits are very good for invalids and also those suffering from acute diseases provided they are chosen with judgment keeping in view the digestive capacity of the individual. Sour and sweet fruits may be given but a better way of giving fruits to patients in acute cases would be to press the fruits and give fruit juice as a drink Fruit juice except those from sweet fruits has little value But they are helpful in nourishing the body with mineral salts and vitamins and by reducing acidosis which naturally increases during the attacks of most diseases.

Juices of sour fruits like lemon, lime, orange and tamarind boiled in water are to be given freely according to the taste and requirement.

Dals :—Dals supply proteins They are difficult to assimilate and may be excluded from the dietary of invalids till the digestive organs come to the normal condition Mung dal is the lightest of dals and should have preference in the dietary of the sick and convalescent persons

DRINKS

Drinks

Soothing drink in place of water may be given when the condition of the patient demands it In irritated condition of the stomach and the intestines as in dysentery, mucilaginous drinks are very useful One form is isafgul water If half an ounce of isafgul seeds is put in a tumbler of water after preliminary cleaning, the whole becomes a flocculent mass after soaking and on being stirred

This may be sweetened and drunk The seeds need not cause anxiety They are harmless and on the delicate lining of the intestines in dysentery the seeds continue to shed the mucilage as they travel down the course In other diseases also where a demulcent drink is necessary, isafgul serves the purpose very well

Bael fruit may be used as a drink The pulp of the ripe fruit is passed through a piece of cloth The pulp is first mixed with some water and strained under pressure of the bottom of a round basin or a round block of wood The forced down pulp is mixed with suitable quantity of water, milk or curd, sweetened to taste and drunk Bael is an aperient and is also a remedy for chronic dysentery and diarrhoea Bael has again the opposite property of softening hard stools and of concentrating liquid stools and lessening the motions in diarrhoea

Other drinks may be made from fruits of season The vitamins provided by the fruits in these drinks have a distinct bracing effect

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Feeding the Sick

How often and when a sick person is to be fed has to be determined for every individual case. Often diet takes the place of medicine and diet given in suitable quantity and quality and at a fixed period becomes a great factor in treatment.

Ordinarily something in the morning, noon, afternoon and evening should be given. If the patient can take a pound of milk and sago at a time, three feeds may be found to be enough with drinks in the intervals. Where only a few ounces are taken at a time by the patient and no more, then feeding must be continued at close intervals.

Often patients refuse to take enough water. Attendants should know that an adult requires 6 pounds of water or fluids to drink. This quantity has to be given in as many divided doses as the patient may conveniently take.

In nursing an unconscious patient attempts should always be made to rouse him to drink. A person can drink almost automatically even in a semi-conscious state. While giving water to drink is imperative, it is equally imperative to see that an unconscious man has nothing poured into his mouth. The liquid, be it a medicine or a drink cannot go down the throat or what is most risky, liquid may find entrance into the trachea and cause choking and consequent death.

INHALATION AND FUMIGATION

Inhalation and Fumigation

In certain diseases the patient needs inhalation. Steam is used as the vehicle and the volatile substance mixed with water is used for steaming so that steam comes saturated with the vapour. A kettle with a long nozzle may be used. Failing that an ordinary kettle will serve the purpose. A small fire place is arranged and fired with cowdung cakes which can heat the kettle for a considerable time without creating smoke. The fire place is brought near the patient on which the kettle is put. Into the kettle is mixed thymol or turpentine with water. On being heated vapour escapes from the nozzle containing the healing substance and this may be inhaled.

Fumigation is a process for filling a space with fumes of the desired substance. For our purpose sulphur may be burnt in the sick room after a patient has vacated it in order to disinfect it before receiving another patient.

In asthma fumes of datura are useful. For this purpose dry datura leaves in powder are placed on a *chihilim* and fired and smoked as an ordinary tobacco. It gives great relief. When a patient cannot suck in the fumes, he may be put under a mosquito curtain and there powdered datura mixed with some carbon and nitre may be put. The mass burns off gradually if lighted by fire. If this is allowed to remain and produce fumes within the mosquito curtain, the patient will feel relieved. The fumes are to be removed by taking off the curtain when the patient is sufficiently dosed.

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Signs of Death

Every one nursing a patient should know when death has occurred. Cases occur in which persons left for dead recover. It is therefore desirable that signs should be known to ascertain absolutely that a person is dead.

- (1) The circulation ceases, pulse is not felt and the heart beat is not felt or heard.
- (2) Breathing is stopped, the chest does not move and a looking glass is not dimmed by breath.
- (3) The body becomes cold, although it may take hours before the body cools down in some fever cases, specially in hyperpyrexia.
- (4) The limbs become gradually rigid.
- (5) The eyes are dull, flaccid and shrunken
- (6) The patient remains absolutely still.

None of these symptoms are however, infallible singly. But a combination of them will indicate death. Certain sign of death is commencement of putrefactive changes. These appear near the bowels first.

INCUBATION PERIOD OF INFECTIOUS DISEASES

Table Showing Incubation, Isolation and Quarantine Periods and Days of Appearance of the Eruptions.

Disease	Incubation period	Day of eruption	Isolation period	Quarantine period.
Cerebrospinal fever	2—5 days	No eruption	During the acute stage Nasopharynx is free from meningococci	Until the Nasopharynx is free from meningococci
Chicken pox	11—23 days (usually a fortnight)	First day	Till all scabs have fallen off—usually 2—3 weeks	21 days
Cholera	1—6 days	None	Whole length of the illness	.. .
Dengue	4—5 days	Initial Erythema —1st day, Eruption— 4th or 5th day	First 24 hours	Contacts should be detained for 5 days

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Disease.	Incubation period	Day of eruption.	Isolation period	Quarantine period
Diphtheria	2 days	None	Till 3 consecutive throat-swab culture reports are negative.	6 days.
Dysentery— (a) Bacillary (b) Amoebic	2—7 days (Unknown)	{ None......	...	...
Enteric Fever	10—14 days	8th or 9th day.	...	...
Influenza.	1—3 days (may be only a few hours).	Rare ...	Till a few days after the acute symptoms have passed off.	...
Malaria	10—14 days	None ...	As long as Gammetocytes are present in the peripheral blood.	...
Mumps	10—15 days	4th day	14 days from appearance of the rash	15 days.

INCUBATION PERIOD OF INFECTIOUS DISEASES

Disease	Incubation period	Day of eruption	Isolation period	Quarantine period
Measles, German	17 or 18 days	First day	Until all symptoms have subsided	21 days
Mumps	15—21 days	None	15 days from onset of Parotitis	26 days
Plague	2—5 days		Rigid isolation till all symptoms completely disappear Attendants must use masks, gowns and gloves	10 days
Small pox	14 days	3rd or early 4th day	Till all scabs have fallen off	16 days
Whooping cough	5—14 days	None	5 weeks.	15 days.

Photograph of the Medical College Hospital, Calcutta.

SOME HOME REMEDIES

Ajowan

Sans.—*Yamani*, Hind & Bomb.—*Ajowan*, Beng.—*Jowan*, Tam—*Omam*, Tel—*Omamu* (*Carum Copticum* · Umbelliferæ) The seeds are carminative and contain an oil which has 40 to 50% thymol in it Ajowan has all the properties of thymol. It kills intestinal parasites. Is good in diarrhoea

Alum

Sans.—*Sphatikari*, Hind—*Phitkari*, Beng—*Phathiri*, Tam—*Patikaram*, Tel.—*Pati-karam*, Mar—*Phatki*, Mal—*Patik-karam*, Burm.—*Keo-khin*

It is sold in bazars as colourless, transparent and crystalline masses. It is a valuable astringent gargle in sore throat, ulceration of the mouth and gums and in other ulcers. The solution may be saturated by keeping enough free powdered crystals in the stock solution for use. Saturated solution may be used for gargle and paint

Alum lotion is valuable in swellings of joints and in bites of insects. 3 to 6 grains of alum in one ounce of water may be used in conjunctivitis. It is used internally to check haemorrhage from the internal organs, such as the lungs, the stomach, kidneys etc

SOME HOME REMEDIES

It is also used to stop excessive menstrual flow. The saturated solution may be used for painting to stop bleeding from the nose or other mucous surfaces. Alum in 10 grains doses is useful in chronic diarrhoea mixed with a little opium ($\frac{1}{2}$ grain) per dose.

Arahar

Hind, Beng & Punjab—*Arahar*, Bomb—*Tuvei*, Madras—*Tuvvar* (Leguminosæ)

It is a commonly used pulse. The green leaves of the plant are pounded and taken with good results in jaundice.

Asafœtida

Hind & Beng—*Hing*, Tam—*Kayam*, Tel—*Inguv*. It is an oleo-resin from the root of a plant which grows in Kashmere and is used as a spice in preparing food. Has great medicinal value as stimulant, expectorant and carminative. Useful in flatulence and in early stages of diarrhoea or cholera. Useful in hysterical fits also. Useful as an enema with water in flatulence and infantile convulsions.

Dose—for diarrhoea and cholera—1 to 2 grains

„ flatulence—5 to 15 grains

„ enema—30 grains in 6 ounces of water

Bael

Hind, Beng & Bomb—*Bael*, Tam—*Vilva pazham*, Tel—*Bilva Pandu*. Cana—*Bilapati*, Guz—*Bilinuphal*

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Bael has a great value in diarrhoea and dysentery. The half ripe fruit is most effective. It acts as a stimulant to the mucous membrane. In dysentery it is particularly useful in chronic cases. The ripe fruit is laxative.

Chillies

Hind — *Mirchar*, Capsicum or Cayenne pepper. Used chiefly as a condiment. The ripe fruit powdered in small doses a carminative. It is a powerful rubefacient and is used as a counter irritant for pains, swelling, headache etc.

Camphor

It is useful in spasms of asthma and in chronic bronchitis. It acts as a stimulant in prostrating febrile diseases and acts as a sedative in delirium. In influenza and coryza it is useful as a nasal paint dissolved in oil. It is generally used as an expectorant and a carminative.

Cocoanut Water

It is stimulant and sustaining. It contains some sugar and mineral salts. Its effect in keeping up the tone of the patient in prolonged illness and in fasting is wonderful. It is unequalled as a harmless, stimulating and sustaining drink. It checks nausea and vomiting.

Garlic

Garlic is an antiseptic and is to be highly prized for use in cases of pneumonia, typhoid etc. and infective

SOME HOME REMEDIES

fevers One dram of garlic may be given in typhoid every 4 hours if the patient will tolerate Even it may ward off typhoid by early use in case of suspected typhoid In diphtheria the constant application of garlic juice reduces temperature and relieves the patient Even after the acute state of diphtheria garlic should be continued to be given internally for a week It relieves whooping cough In phthisis it has got an extensive use

It relieves blood pressure considerably and on that account may be usefully employed in many diseases where the reduction of blood pressure is to be effected

Dose —30 grains, 3 times daily

Lemon

The principal content of the juice is citric acid It contains vitamin C to a marked extent In fevers and in inflammatory affections it relieves thirst Its use in finishing meals has been explained in connection of hygiene of the mouth and teeth In order to correct the alkalinity of urine, lemon juice is useful

Linseed

When slightly fried and powdered linseed makes an excellent material for making poultice The powdered stuff is boiled with sufficient water to bring the mass to the consistency suitable for making poultice Linseed boiled in water makes an excellent mucilage which can be used as a valuable drink for

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soothing the mucous membranes as in the cases of dysentery and gonorrhœa.

Myrobalan

It is a safe aperient. It has got anthelmintic properties and in good doses of 3 fruits at a time, it may throw off round worms with the purgings. It corrects constipation by regular use and cures the sores in the mouth. It is good for dyspepsia also. Ulcerated wounds heal quickly if covered with a paste of myrobalan on account of its astringent properties.

The decoction may be sprayed in burns with good effect. Where it cannot be sprayed the decoction may be applied with a piece of rag. Application should be repeated every two or three hours.

It is a good application in paste form to piles mixed with some opium. Internally it is also good for piles as a harmless aperient.

Dose :—Purgative—3 fruits

Decoction—1 fruit per 4 ounces of water

Neem Leaves

Decoction made from 20 leaves per ounce of water is good for washing wounds as an antiseptic lotion. It is good for skin affections. Neem oil may be used in place of neem leaves decoction. Neem leaves in paste form may be taken internally as an antiseptic.

WEIGHTS AND MEASURES

Punarnava or Ghetuli

Sans.—*Sothaghnī*, Hind.—*Sant*, Beng.—*Punar nava*,
Bomb.—*Ghetuli*, Tam.—*Mukukrattai*

The herb is used in green or dried state. It has marked properties of increasing the flow of urine. It strikingly removes water of ascites or dropsy from the system by promoting the action of the kidneys. It is therefore very useful in beri-beri, kidney diseases and dropsy.

Dose — $\frac{1}{2}$ to 1 oz of green plant 3 times daily.
 $\frac{1}{2}$ dram of dry powder " "

Weights and Measures (Avoirdupois Weight)

Measures of Capacity

			symbol
1 minim	..	..	m. or min
60 minimis		= 1	fluid drachm fl. dr. or ʒ.
8 fluid drachms		= 1	fluid ounce fl oz or ʒ
20 fluid ounces		= 1	pint . O (octarius)
8 pints		= 1	gallon G (congius)

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English Domestic Measures.

1 tea spoonful	=	1 fluid drachm or slightly more.
1 dessert spoonful	=	2 fluid drachms.
1 table spoonful	=	4 fluid drachms or $\frac{1}{2}$ fluid ounce
1 wine glassful	=	1 $\frac{1}{2}$ to 2 fluid ounces.
1 tea cupful	=	7 fluid ounces
1 breakfast cupful	=	8 fluid ounces.
1 tumblerful	=	11 fluid ounces
1 quart	=	24 fluid ounces

Indian Domestic Weights and Measures.

1 rupee or 1 tola	=	180 grains.
1 copper pice	=	100 ,,
1 half-kancha	=	$\frac{1}{2}$ chhatak = 2 fluid drachms
1 kancha	=	$\frac{1}{4}$, , = 4 , ,
1 chhatak	=	$\frac{1}{2}$ Poa = 2 fluid ounces (about)
1 poa	=	$\frac{1}{4}$ seer = 8 fluid ounces (about)
1 seer = 16 chhataks	=	32 fluid ounces = 2 lbs (about) = 80 tolas
1 maund	=	40 seers = 82 lb. 2 oz 3 dr
1 ton	=	27 maunds.

CHAPTER—VI

HOME TREATMENT OF SYMPTOMS

Introductory

This chapter has been written with the object of indicating simple methods of dealing with diseases at home. Symptoms have been taken here and the diseases in which these symptoms occur have been dealt with under each symptom. A fairly long range of common diseases has come under the different heads of symptoms. The diseases touched in this chapter are

Symptoms	Diseases
Stools	Grey stools of bile deficiency, green stools of bile excess, stools of constipation, dyspepsia, diarrhoea, severe diarrhoea, cholera etc
Pain	Colic of indigestion, gastric and duodenal ulcers, gall stone, renal colic, dysentery, intestinal obstruction, pneumonia, bronchitis, pleurisy, angina pectoris, pain in eye, ear and tooth, boils, pain peculiar to women, pains of difficult

HOME TREATMENT OF SYMPTOMS

breathing, asthma, heart troubles, headache and insomnia.

Vomiting ...	Of nausea, sea sickness, morning sickness.
Fevers ..	Malaria, kala-azar, influenza, dengue, measles, small pox, chicken pox, erysipelas, diphtheria, typhoid, rheumatic fever and mumps.
Coughs ...	Of whooping cough, bronchitis, pneumonia, tuberculosis etc.
Fainting ..	In various diseases
Jaundice ...	Jaundice in different diseases.
Inflammation	Of various organs.
Dropsy ...	Dropsy of the heart, kidney and intestinal diseases, beri-beri or epidemic dropsy.
Eruptions ...	Eruptive fevers, leprosy, syphilis, typhoid etc.
Bleeding ulcers	Ulcers in the mouth, stomach intestines and on the skin.

Prevention of these diseases have been indicated in the previous chapters on Care of Systems, Nutrition, Sanitation and Nursing. Now remedial appliances and drugs are indicated to be brought into use here for coping with the numerous symptoms of diseases

A. The appliances and processes, B. the household drugs and C bazar drugs indicated are :

SOME CHEAP REMEDIES

A Massage, spring shower bath, fomentation, compress, wet pack, warm pack, plasters, poultices, liniments, lotions, douche and enema have been dealt with in the previous chapter on Nursing

B Materials of curative value usually found in and about houses and with the uses of which householders are familiar have been chosen and indicated for treatment of diseases They are

Ajowan, Alum, Arahār leaves, Asafœtida, Bael, Chillies, Camphor, Cocoanut water, Garlic, Lemon, Linseed, Myrobalan, Neem leaves, Punarnava or Ghetuli They are described in the previous chapter on Nursing

C Medicines which are indispensable have been taken in while suggesting cure for the common ailments They are described in chapter IX on Cheap Remedies

1 Arjun	13 Kurchi
2 Boric acid	14 Magnesium sulphate
3 Calc lactate	15 Makaradhwaja
4 Calomel	16 Nux vomica
5 Castor oil	17 Opium
6 Chota chandra	18 Papaya milk
7 Cinchona febrifuge	19 Potass bromide
8 Copper sulphate	20 Quinine sulphate
9 Datura .	21 Soda bicarbonate
10 Eucalyptus oil	22 Soda salicylate
11 Iodine tincture	23 Ulat kambal
12 Kalmegh	24 Vasaka

HOME TREATMENT OF SYMPTOMS

For treatment of diseases, it is not enough that this chapter only be read. The previous and the subsequent chapters—the entire book has got to be read also.

The drugs to be used here, their properties and preparations along with some more others are described in Cheap Remedies Chapter X to chapter XVIII deal with specific diseases of which the symptoms are dealt with here. In these chapters, the diseases are more thoroughly described and treatment suggested with the help of some more drugs. But for home treatment so many drugs are not needed and also it is not possible to use them. The reader should go through the whole literature but for treatment confine himself to the 24 items tabled here. They are well-known and most of them are easily available.

The object here is to bring to bear all the accumulated knowledge in the different chapters of the book to bear in cases dealt with in this chapter and treat them with a limited number of medicines. It is a difficult task, and unless one knows all about the diseases given elsewhere in this book, the brief description given in this chapter will not be of much use.

The contents in the beginning and the index at the end of the book should be liberally used and everything pertaining to a particular disease or aspect should be gone through in order that proper selection of the methods of dealing with the disease may be made with the utmost advantage.

STOOLS IN DISEASES

The character of stools of the patient should be observed - Colour and consistency, quantity and number of evacuations should be noted Examination of stools will reveal much about the condition of the disease and will be suggestive of methods for simply combating the disease

White or Grey Stools of Bile Deficiency

White or grey stools indicate deficiency of bile In early stages they may be easily corrected Soda bicarb mixed with drinking water may provide the necessary alkali Bitters induce the secretion of bile and there are several items of dietary in every province which consist of bitters

Jute of the common variety has bitter leaves Tender twigs of jute are eaten as an ordinary vegetable during the season The leaves are dried and preserved The dried leaves are washed and then kept for infusion in water The water has a red tint and is bitter This water has the property of inducing the flow of bile The leaves may be eaten cooked with other vegetables Neem leaves are also useful and may be taken raw ground in the form of paste or they may be boiled with other vegetables and taken

HOME TREATMENT OF SYMPTOMS

Kalmegh in green state or in a dry condition may be taken. Dried plants are made into powder and then pressed into tablets in Cheap Remedies. 3 of these tablets or 15 grains of dry plant in powder may be taken after each meal. Patal is a very common article of diet in Bengal. The fruits are taken as vegetables. The leaves are bitter and are used as dietetic medicine. The leaves are eaten with vegetable in the cooked form. They may be taken raw after being ground to paste.

Ucchea and Karala are articles of daily food. They are bitter and stimulate the torpid liver to action. They are cooked and taken as food.

Calomel in $\frac{1}{2}$ grain dose, 3 to 4 times a day is an excellent cholagogue. It may be taken for a day or two in addition to the bitters included in the diet.

Coloured or Green Stools of Bile Excess

Coloured or green stools indicate excess of bile. This may be corrected by including acids in the dietary. Bile is alkaline. The commonest dietetic acids are the citric and tartaric acids in lemons and tamarind. Lemons and tamarind, in fact any easily digestible sour fruits may be taken to correct excess of bile. *Kapitha bael*, a sour fruit used for making chutney is also good.

Hard Stools of Constipation

Hard stools are due to constipation. When stools are hard, they indicate that more water has been

STOOLS IN DISEASES CONSTIPATION

extracted from them than is normal. The stools get hard by long stay in the intestines and water is lost thereby. The remedy lies in taking more water. This will help to keep the stools soft. But the cause of hardness may lie deeper. Owing to some fault in constitution the intestines may be sluggish in expelling refuse material. Taking plenty of water may not then have the desired effect. In order to bring the normal tone to the intestines washing out of the formed stools is a good method. For this purpose enema is to be used. A convenient form is to attach a No 10 catheter to a douche-can and introduce a pint or two of water at the body temperature slowly. This will help to break the lumps and facilitate their removal.

If too hard lumps near the anus prevent passage of the rubber tube then a finger may be introduced after oiling and the obstruction removed.

Regular douching for some time may help to bring back the normal condition. In any case plenty of water should be drunk. Roughage must be increased in the food stuff by taking more of leafy and fibrous material and husk of cereals. These are apt to leave soft residue and give bulk to excreta. There may be a minimum bulk necessary in each individual.

Fruits having an aperient action should be included in the dietary. Most fruits have laxative action but some are particularly helpful. Bael is one of the most useful fruits. Ripe bael is good. When raw, bael may be heated over a fire with the outer crust on, so that the interior may get cooked and softened. Raw bael sliced

HOME TREATMENT OF SYMPTOMS

and preserved in syrup, is a good article of diet for the constipated. Raw bael may be dried and powdered. This powder may be administered as a diet mixed with milk or the powder compressed into tablets may be used. Individuals have idiosyncrasies about laxative action of different articles of diet and there are articles of diet of which the patient may have experience of having laxative action upon him. Such articles should be introduced in the system with food. Isafgul is a good lubricant and a food. Myrobalans are good and one, two or three fruits may be taken daily at bed time made into a paste with water according to the nature of constipation. Constitutional diseases like gout and rheumatism are associated with caustiveness. This may be the cause or effect of those diseases. In any case dietetic care should be taken to ensure regular evacuation and where mere dietetic changes are not enough, myrobalans should be taken and douche has to be used wherever possible. Where myrobalan is not liked or effective, castor oil in one ounce dose should be given. Where these measures fail there is magnesium sulphate to effect purgation if given in half an ounce dose. Some persons require an ounce or more to induce good purgation.

In chronic cases mud plaster put over the abdomen sometimes does good. The plaster is formed of plastic clay, moist but not enough for water to dribble off from it. The plaster is put on the lower abdomen and covered over with a plantain leaf and bandaged. The plaster is to be tried patiently for weeks on end.

STOOLS IN DISEASES DYSPEPSIA

in order to see if it can bring about normal evacuation

Dyspepsia

Constipation is associated with dyspepsia. The patient cannot digest his normal food. Acidity gives trouble. Dyspepsia is usually the result of error of food or dietary habits.

Treatment should be directed towards correcting the habits which have brought on the derangement of the stomach. Plenty of water should be taken. The action of the skin should be improved by massage and baths with friction of the skin. Non-irritating food like rice and dahi should be given. Where dahi is not tolerated milk may be given but dahi is the better diet.

Spices should be avoided so also too hot and too cold drinks. The hours of meals, work and sleep should be regulated and rigidly adhered to. Where there is acidity soda bicarb should be taken after food and where fat is difficult to digest, milk should be made fat-free. Dals contain too much proteins. Dals may be avoided wholly for sometime. Digestion should be improved by taking 10 drops of papaya milk in sugar after every meal with some soda bicarbonate.

Undigested Matter in Stools or Stools of Indigestion

In certain cases undigested material is found in the stools. This indicates that the digestive system

HOME TREATMENT OF SYMPTOMS

has been unable to cope with the material delivered to it for digestion. If the undigested material is found to be an extraordinary item of diet then it may be taken for granted that the particular material was given to the stomach injudiciously or without bringing it into a condition fit for digestion by sufficient mastication. The matter is more serious if usual food is thrown out in part undigested. As the organs try to perform their functions faithfully, it must therefore be assumed that the passing out of undigested material is the result of failure of the digestive organs in their trial to perform their duty. It indicates a state of unusual strain on the organs. Organs put to unusual strain get irritated and the consequence is that if now the customary duty is demanded from it, if the digestive system is required to deal with usual food, it may refuse to comply. It would therefore be wise to deal considerately with irritated organs. In case of the evidence of undigested material in stools, food should be either stopped for a day or only liquid food should be given involving the least amount of work on the part of the digestive system.

Carminatives are helpful at this stage in bringing back tone to the digestive organs. Carminatives are mostly spicy materials. The chief may be said to be ajowan. Ajowan may be ground to a paste with water on a stone and then administered. Cloves and cinnamon have their uses here. Soda bicarb may be combined usefully with the carminatives. Papaya juice or milk is of marvellous efficacy in indigestion.

STOOLS IN DISEASES DIARRHÖEA

if given in 10 drops doses with sugar thrice daily. Asafœtida is a good thing for the irritated stomach. Abstention from food and a dose of asafoetida will subdue trouble in most cases

When indigestion is accompanied by sour eructations and uneasiness, something beyond mere carminatives has to be used Soda bicarb is a necessity, camphor and chalk with spices should be given Nux vomica is of great help at this stage One tablet of two grains of nux vomica repeated two or three times a day is a good thing Nux vomica under the name of *Kuchila* is available in bazar This is a poisonous article and should be carefully handled The seeds are flat, circular and of the size of a pice They are very tough A bit is to be sliced off The seed is sliced, dried and powdered in a mortar and divided into several two grains doses It is better to obtain two grains tablets rather handle the preparation of such a poisonous drug at home For the higher doses nux vomica is a virulent poison

Frequent Stools of Diarrhœa

When the passing of stools becomes frequent, their character has to be specially observed If they are passed more or less painlessly and indigestion accompanies them, then they may be ascribed to diarrhœa. If there is pain in the abdomen which is temporarily relieved on passing stools and which increases on movement, the stools should be examined for mucus. If there is mucus then proceed as with mucus in stools.

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The frequency of stools in diarrhoea need not be stopped for sometime; ajowan and sodi bicarb being used as in simple indigestion. The offending ingesta may be allowed to be purged out so that the stomach may get corrected. If there is too much frequency and appreciable loss of strength, then it is time to stop. Camphor is helpful in this stage 5 grains may be administered per dose. Camphor however should not be depended upon. The most effective and necessary thing now would be to give 2 grains of bazar opium by mouth in $\frac{1}{2}$ grain doses every hour or every 2 hours. Opium should be mixed with some chalk powder and ground in order to present it in a finely divided condition thereby increasing its efficiency. Opium will at once give relief and stop excessive purgation.

The patient should be kept in bed. His body and extremities should be kept warm. Walking long distance for purgation is to be avoided.

Watery Stools of Diarrhoea

Watery stools are characteristic of severe diarrhoea. When there is some coloration due to bile, we call the stool as of choleric diarrhoea and when there is no trace of colour but simply white turbid water is passed we call it choleric stool.

In the early stages when there is some solid matter in the stools, precautions should be taken so that the disease may not advance further. Opium is very effective at this stage. All food should be stopped and

STOOLS IN DISEASES CHOLERA DYSENTERY

plenty of water should be given for drinking. The patient should be put to bed.

If the stool is choleric, treatment as indicated under cholera in chapter XI should be undertaken. If calomel and soda bicarb are handy then without loss of time calomel in $\frac{1}{4}$ grain doses with soda bicarb 30 grains should be given at 15 minutes' intervals. If the extremities are cold, hot water bottles should be applied.

Watery stools mean withdrawal of so much serum from the blood. Water should be given for drinking to the patient without hesitation. In fact, water in plenty should be regarded as a medicine. If there is vomiting, water in small quantity at a time should be given.

Mucus Stools of Dysentery

These stools are due to the inflammation or ulceration of the mucous membrane of the large intestine. The disease is infectious, the infection being carried through microbes getting in with food. It spreads by contagion and infection. There are two types, amoebic and bacillary. Sometimes there is a combined attack of both. In cases of dysentery the first attempt should be to clear the intestines of the accumulated offending material in the form of disintegrated mucus and simultaneously there should be an attempt to soothe the surface.

The characteristic of dysentery is the painful evacuation. Not much stool is passed and sometimes

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there is simply mucus coming out at an attempt to pass stool. The stomach and the intestines of course refuse to act normally under the infected condition and food creates harm. In the case of bacillary dysentery, the prostration is quick and the number of stools is very great, there being 4 or 5 motions per hour or more

In either case the patient should avoid all movements and lie in bed. The treatment should begin with one dram dose of castor oil every two hours for 4 doses. Much relief is expected to come out of it Kurchi is a specific in dysentery and should be given 4 tablets per dose or 20 to 30 grains dry kurchi bark powdered and made into paste Bael is very useful and should be administered in the form of thin syrup. Unripe bael is more efficient than ripe one Unripe bael should be pounded and made into paste and administered in one dram doses

When castor oil and kurchi fail, magnesium sulphate in one dram doses should be continued with kurchi. This will tackle bacillary dysentery. Children almost always are attacked with bacillary dysentery, therefore in this case treatment should commence with a proper dose of mag. sulph. according to age, taking one dram to be the full adult dose.

Diet should be restricted to dahi diluted with water and beaten up. No solid food should be given. Sugar in excess irritates the mucous membrane of the stomach and intestines and should therefore be avoided.

When the acute stage is over, barley or sago may be given with dahi Mud plaster on the abdomen may soothe and give tone to the weakened organs

Foul Stools in Beri-beri

Beri-beri is a deficiency disease and has been dealt with in the chapter on Nutrition The nutritional defects should be removed

Once the disease has set in, the patient should be given complete rest The heart gets very seriously weakened and any movement is injurious

Vitamin B should be administered through feeding the patient boilings of unpolished rice in good quantities

Molasses or *gur* diluted to the thinnest form to give just a sweet taste may be fermented with the ferment of a little toddy and kept on till a white sediment deposits at the bottom of the vessel This is yeast This is to be separated and given to the patient The fermentation of *gur* is complete in about 4 days Therefore fresh lots should be started every day and used on the 4th day The fermented *gur* is to be thrown away and only the white sediment is to be given

For correcting the foulness of stools one grain of calomel divided into four fractional doses should be given daily and the bowels kept moved by suitable aperients or castor oil consistent with the strength of the patient If any signs of the effects of mercury

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appear indicated by the affecting of the gums then calomel should be stopped. Makaradhwaja may be used in place of calomel.

Worms in Stools

Three varieties of worms are commonest, the thread worm, the round worm and the hook worm. The thread worms come out with stools as white little threads about half an inch long. They reside generally near the rectum and feed on faecal matter. They injure the passage and create irritation there causing an intolerable itching and sometimes come out by themselves even when one does not sit for evacuation.

They are killed by common salt or saline solution. Children suffer most from their attack. Saline solution introduced into the passage through a syringe or a douche-can kills the living ones but the eggs are not killed. The operation is to be repeated daily for two or three days so that all hatched eggs are destroyed and no eggs are left behind.

Another method is to take a little cotton and saturate it with saline solution and introduce it into the rectum where there is most irritation. This will also kill the worms effectively.

The round worms are long creatures sometimes becoming about ten inches long. They reside in the intestines and create great disturbance to health. Round worms cause salivation, itching of the nose,

WORMS IN STOOLS

grinding of the teeth during sleep, incontinence of urine, emaciation and swelling of the abdomen. Sometimes they leave the intestines and enter the stomach and may thence get off through the mouth or nose during vomiting. They have got to be thrown out with stools alive or dead. They undermine health in various ways, sometimes causing convulsions even faintness in children. Myrobalan acts as a poison to them, weakening them and at the same time removing them with purgations. Proper doses of myrobalan should be given for some days.

A strong dose of ajowan (thymol) followed up by magnesium sulphate may dislodge them. Fasting a day before using myrobalans or ajowan is necessary to weaken them for expulsion.

Hook Worms — It is not so easy to detect these worms in stools as the thread or round worms. They have hooks with which they attach themselves to the mucous membrane of the upper part of the small intestine. Whereas the thread and round worms enter the human system through eggs which may be swallowed with water or food, the hook worm parasites from stools in which they have been purged out develop outside and attack the feet of persons walking bare-footed. They bore hole through feet or even hands and get into the blood and are carried with the blood stream to the duodenum where they remain lodged by their hooks.

PAIN

Pain is a general term. The character of pain differs widely and the seats of pain are various. The pain is to be located first and its region guessed in order to treat it successfully. The pain may originate in various regions of the body as in the stomach, the duodenum, the liver, the intestines, the appendix, the kidneys, the rectum, the heart and lungs and in females the pain may be in the uterus, fallopian tubes and ovaries.

Colics

If the pain is of a sudden onset and the patient is restless and if there is a tendency to vomiting and if vomiting relieves pain, then we may conclude that one of the three things may have happened. The pain may be due to gastric or duodenal ulcer or it may be biliary (hepatic) colic or colic due to gall stones.

Colic of Indigestion

If on enquiry, irregularity or fault of eating is found out then it will be safe to conclude that the pain is due to gastric colic. The patient may vomit and the vomitus will then show undigested food. This irritates the stomach causing pain. There is often a

GASTRIC AND DUODENAL ULCERS

desire to go to pass stools accompanying this form of colic

Treatment lies in emptying the stomach of the offending material. Vomiting may be induced and if there has been vomiting already but the whole of offending matter has not come out then also vomiting has to be induced by one or other of the methods known to us. For vomiting, plenty of salt water may be given for drinking, failing that water tinted a little blue with copper sulphate may be given. In this way the accumulated water and offensive matter will be thrown out. After this alkaline drink should be given. The vomitus in such cases is mostly of acid character. Soda bicarb is the medicine here to be given in 30 grains doses. In excessive pain opium is a great soother. It may be given in a single 2 grains dose or in one grain dose repeated at intervals of 2 or 3 hours.

Pain of Gastric and Duodenal Ulcers

When the pain is of a burning character radiating towards the back, when the pain in its severity induces vomiting and vomiting gives some relief, when indigestible food induces pain while milk diet soothes it, when the pain appears immediately three or four hours after meals, we may conclude that the seat of pain is ulcer in the stomach or the duodenum. The pain may continue for days and weeks. The patient gets emaciated, the eyes get sunken and is ultimately incapacitated for work.

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This pain is due to excessive acid secretion by the gastric glands injuring the already ulcerated surfaces. The remedy lies in giving large doses of soda bicarb after every meal and also in giving food to the patient in divided quantities as often as possible so that the stomach may never get empty. Every two hours any light food say soft rice, roti, chura, dahi or some sweet fruits may be given. Care is to be taken to see that the total quantity of food given is not excessive. Total quantity should be rather less than normal for the patient. Food in repeated doses along with the administration of soda bicarb has cured some of the most obstinate cases in which patients got despaired of being cured at all.

**Biliary Colic or Hepatic Colic or Colic
due to Gall Stones**

Pain originating in the liver in addition to its common characteristic of being sudden and of being relieved by vomiting has a peculiarity in as much as there is a feeling of chill at the onset of the pain. The patient feels cold, sweats profusely, becomes restless and has nausea sometimes vomiting. The pain comes suddenly and the disappearance is also sudden. It may come and pass off and come again. Constipation is complete. Vomiting may give relief. Vomiting is of scanty liquid with mucus or bile.

The seat of pain in such case is the neck of the gall bladder. Concretions or stones form in the gall

BILIARY COLIC GALL STONES

bladder and these may choke the bile duct causing stoppage or obstruction of the flow of bile. This particular channel is very sensitive. Crystals of stone getting into the duct cause irritation and constriction of the duct which causes further pain. If the stone is passed out into the small intestine, relief is felt at once. The blockade may remain for hours or days causing excruciating pain. One little piece of stone may pass off giving relief succeeded by another which again will restart pain.

The remedy lies primarily in vomiting. Vomiting may be induced by drinking plenty of water or hot saline water or by very light copper sulphate solution. Vomiting effort causes exhaustion and relaxation of the muscles. The relaxation of the muscles automatically causes alleviation of pain, as the pain was greater the greater the tightness with which the duct held the concretions. Magnesium sulphate thins the bile and brings relief. It should be given in repeated 2 drams doses. Sedatives also cause relaxation and should be used. Chota chandra is an efficient sedative and should be tried. Fomentation is of benefit in bringing relief. Opium is of great value. It makes the patient sleep and after sleep the patient may find himself to be well.

There is chance of mistaking gastric ulcer for colic of gall stones. So in all cases of suspected gall stones, the treatment for gastric or duodenal ulcer should be continued, namely, administration of soda bicarb and feeding the patient at short intervals.

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This can do no harm in gall stones but if pain is due to ulcers, it will cause healing.

Pain of Renal Colic

Of the pains in the abdomen, renal colic is one and it is one of the most severe pains known. It is caused by renal calculi obstructing the ureters. It is started by some shaking movements of the body as in a train or in riding. The pain is violent radiating down to the genital organs and groins. The scrotum gets drawn up. The patient rolls on bed or gets on all fours in agony and draws up his legs to relax the abdominal muscles. The obstructing material causes abrasions and there are frequency of micturition and presence of blood in urine.

The abdomen should be fomented and sedatives should be given such as chota chandra in 30 grains or potass bromide in 10 to 30 grains doses. The colons should be emptied by purgation with enema so that any local pressure may be relieved. Copious liquid drink should always be taken. When the pain is unbearable, opium may be given as directed under biliary colic.

Pain in the Appendix

The appendix may get inflamed on account of the accumulation of rotten matter in the vermiform appendix. The pain is inflammatory and its one characteristic is that the patient remains quiet and motionless, any movement causing more discomfort. The pain is general all over the abdomen but the centre

APPENDICITIS DYSENTERY

of severity is in the right iliac depression. Sometimes a tumour may be felt, the inflamed appendix appearing like a tumour. In chronic cases there is mild pain continued for months.

Mild aperients occasionally render an attack of appendicitis abortive. But aperients should be judiciously given and should be withheld in suppurative type. Treatment consists in improving the general health. Hot fomentation should be applied so that the toxins may get absorbed. Sedatives may be given internally in the form of chota chandra and opium. Opium mixed with honey may be applied externally over the region. Datura leaves in paste form may be painted over the area and then hot fomentation applied over it or the reverse may be done.

There is necessarily congestion in the locality. 5 or 6 leeches applied on the area are said to have a charming effect in some cases.

Pain in Dysentery

A gripping pain in the abdominal region with tenesmus or rectal pain and spasm accompanied by stools having a frequency of 10 to 50 times a day, the character of stools being flocculent and full of mucus and blood indicates dysentery. Fever, nausea, vomiting and retching may be present. The pain sometimes becomes colicky.

Dysentery is aggravated by movements so even in very early and mild cases all movements should be

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avoided and the patient be given complete rest. For treatment see mucus in stools.

Pain in Intestinal Obstruction

Sometimes a person in health, on account of irregularities in eating or some acute or chronic constriction in the intestines gets the gut choked. Fæcal matter cannot pass down. This causes intestinal obstruction. A person is suddenly seized with pain. The pain is so severe that the man is doubled up and the pain is continuous. It is of a stabbing nature at first and then becomes colicky.

Vomiting commences soon and the stomach and the intestines are emptied out, the character of vomitus becoming fæcal. Vomiting may commence one to eight hours after the appearance of pain. There is stoppage of flatus. Constipation is absolute and the patient becomes prostrated and has an anxious look. If obstruction be complete and prolonged some fæcal matter may be vomited. Enema does no good but should be tried. Enema containing turpentine oil and soap water should be given attaching a catheter to the nozzle of the douche-can pushing it as far as it will go. Some water will come out and some water and oil may remain softening the stool which may in time cause removal of the obstruction due to concretion of hard stool. If the obstruction is severe, surgical aid will be necessary.

PAIN IN LUNG DISEASES

Pain in Lungs and Heart

In the thoracic region pain may have its seat in the lungs or their covering, the pleura or in the heart. Pain in the lungs is commonly due to pneumonia, bronchitis or pleurisy and sometimes it is complicated with influenza.

In pneumonia the onset is sudden with a shivering and the temperature rises high from 103° to 105° F or even higher. It is quickly accompanied by severe cutting pain on the affected side. Irritating dry cough appears and the pain on coughing causes so much suffering that the patient usually tries to suppress cough. The sputum is rusty. The crisis comes on the seventh day.

In bronchitis the pain is in the sternum and in muscles of the heart. It is a dull pain. There is aching of the limbs and a feeling of oppression on the breast. Temperature is 99° or 100° F. It may go up to 103° F in more severe cases. Sputum at first is scanty and then becomes copious.

In pleurisy sudden acute pain appears on one side accompanied by short, dry and ineffective cough. Coughing or even slight movement intensifies pain. While the pain is aching in bronchitis and pneumonia, it is stitching, stabbing or lancinating in pleurisy. In some cases there may be no fever in pleurisy.

In all these diseases the general line of treatment is the same. The patient must be given complete rest. Counter irritants and anodynes in the form of

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liniments, paints and hot poultices are to be applied on the affected parts of the chest. The bowels are to be kept moved. If necessary, sedatives in the form of chota chandra or pot bromide are to be given. Plenty of water should be given for drinking. If the temperature is very high in pneumonia, it should be brought down by cold application. The body should be massaged and sponged. Diet should be confined to liquids like milk and sago. Nature does the healing and nature's process of healing may be supported by above means.

For counter irritants and anodynes, the following should be tried.

Dry datura leaves with some pepper are ground into paste with water. A little aloes is mixed in order to give the required stickiness to the plaster. The plaster is changed twice daily.

Hot linseed poultice with some essential oils mixed with it is applied on the chest. The essential oils are various. Oils of cloves, cinnamon or turpentine oil may be used. Camphor and menthol are very useful, they are dissolved in any oil and then mixed with poultice. Half dram of essential oil per pound of poultice may be used. Clay also may be used as a medium for application of essential oils and irritants to the chest. Dry clay is mixed with honey and water into a thick paste, with this is incorporated the above essential oils in the same proportion. The paste is plastered on the chest and kept bandaged. Inhalation of steam is good. In the steaming kettle

ANGINA PECTORIS

may be put a few drops of turpentine or eucalyptus oil. The vapour mixed with this, brings relief on inhalation. A simple anodyne liniment may be made by dissolving camphor 1 dram and menthol 10 grains in an ounce of any expressed oil like sesamum or rachis (groundnut) oil.

Quinine in small doses is useful in these cases. The patient must have plenty of fresh air in these respiratory diseases. Sponging is very necessary.

Angina Pectoris — Pain in the heart is of a different character from the pain of the group of lung affections just mentioned. The pain in the heart may be due to angina pectoris. In this the patient feels intense pain on the sternum. It generally comes after an exertion or excitement or exertion after a heavy meal. The pain is radiating and the intenser the pain, the more radiating it is. It spreads to the left arm and even to the right arm and over the back. In severe cases the heart appears to be held as in a vice. The patient becomes anxious and where pain is very intense, the patient apprehends an immediate death.

It is most apt to be mistaken for biliary colic coming as it does often after a meal. In angina pectoris like biliary colic the patient may belch out a large quantity of wind with subsequent relief. The pain is also radiating in both and the pain of angina pectoris may travel down to the abdomen like that of biliary colic. The difference should be sought for in

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the mode of onset. Biliary colic comes whether there is exertion or not but angina is usually preceded to by an exertion. Angina pectoris is relieved by inhalation of amyl nitrate or by keeping very minute quantity of nitroglycerin tablets under the tongue or by inhalation of chloroform All these act by reducing the blood pressure. The response of the pain to such treatment may serve to differentiate between angina pectoris and biliary colic. Where in a case of angina pectoris, none of the above is available, application of heat over the area by way of fomentation is useful Some garlic juice may be administered to relieve blood pressure.

The patient should be careful to avoid exciting causes of angina. The patient must live within the limits of strength of his heart The attacks are likely to occur when there is tiredness or exhaustion of the heart or the nervous system Great importance should be attached to mental work. The patient should not engage in physical exertion soon after a meal or against a strong or cold wind All excitement and worry should be avoided and bowels must be kept moved Massage is very helpful.

In pain of other heart diseases, rest with moderate exercise should be undertaken and the heart should be strengthened by taking arjun bark in half dram doses two or three times daily for sometimes. *Nux vomica* also is useful. Bowels should be kept freely moved and massage and baths should be taken to improve the general health.

PAIN IN MUSCLES AND JOINTS

Pain in the heart due to indigestion, pressure of gas or heartburn which often precedes the pain should be relieved by carminative and soda bicarb

Pain in Joints and Muscles

On account of constitutional diseases like gout and rheumatism there may be pain in joints and muscles of various parts of the body. These pains are easy to identify. They are aggravated by cold and diminished by application of heat. Constipation is more or less a constant factor.

A great thing in such pains is to apply heat over the affected parts by way of fomentation and hot baths. If the pain is distributed over large areas there is nothing like hot sitz bath once or oftener during the day. Whenever possible a large tub is to be used. In villages earthen-ware tubs used for feeding cattle may be had of large size and at cheap rate. A tub of suitable size may be procured so that on sitting in it the body up to loins can remain under water. The tub is to be filled with hot water, temperature being such that it may not scald the skin. The use of such baths along with use of laxatives is useful in removing such pains. Turpentine fomentation over the affected parts is useful and should be combined with hot sitz bath. Diet should be simple and light. Massage over the affected parts and generally over the body is very useful. Sodium salicylate is very effective in such pains. Where available 3 to 5 tablets or 15 to 25

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grains per dose with an equal amount of soda bicarb may be given three times daily

Pain of Nerves or Neuralgias

The nerves carry sensations to and from the brain. When they are irritated in a particular way they cause the sensation of pain. This is true of all pains but neuralgic pains are those in which the nerves are directly and primarily concerned. Neuralgia may appear on the face and cause pain to a part of it. Headache is the commonest form of neuralgic pain. The end of a tooth may irritate a nerve and neuralgic pain of the tooth may cause great distress. The muscles of the chest may be painful on account of some of the nerves being affected. Then in the lower limb the sciatic nerve may be affected and cause pain in every motion, particularly in every change of position. Injection of magnesium sulphate solution 12½ to 25% deep into the affected muscles brings great relief. The site may be pricked deep with ordinary stout sewing needles after sterilisation. This is also an effective method of curing long standing sciatic pain or sciatica.

Counter irritation does a great deal in relieving neuralgic pains. Fomentation is useful in bringing relief. In headache counter irritants in the form of essential oils or menthol in oil may be applied. A few crystals of menthol may be dissolved by rubbing with a few drops of mustard oil and this mixture

NEURALGIAS UTERINE TROUBLES

may be rubbed over the painful part bringing great relief Small bits of mustard plaster may be applied In migaine where only half the head is affected, the leaves of *drona puspa* made into paste and applied over the temples before sunrise are highly efficacious

Caffeine and aspirin wonderfully relieve neuralgic pain But aspirin is intolerable to some due to slight depressing effect on the heart Overdosing with caffeine and aspirin is distinctly harmful

In muscular pains and in pains of joints datura is quite good Chillies may be added to increase the irritating effect Sodium salicylate proves very efficacious in many cases of muscular and rheumatic pains

Pain Peculiar to Women

Women have pain in the pelvic region on account of uterine troubles and also irregularity and abnormality of menstruation The first thing of importance is to lie down in bed and give rest to the organs Hot sitz bath, failing that hot fomentation and application of hot water bottles are most useful Sedatives should be given Chota chandra is an excellent sedative and also potass bromide Juice of roots of abroma augusta or ulat kambal is very efficacious in all pains due to menstrual irregularities Ulat kambal roots may be used in powdered form when fresh root is not available Purgatives relieve the pelvic congestion and pain

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Pain in Ear or Earache

Garlic juice dropped into the ear relieves ache
Opium pasted in water and dropped serves the same purpose.

Pain in the Tooth or toothache

Pain in the tooth or toothache is caused by the nerve endings at the root of a tooth being inflamed or irritated. .

The irritation may induce the formation of pus. The formation of pus in the gums is called pyorrhœa. It not only makes the gums tender but is a fruitful cause of many other diseases. It can go so far as to infect the whole system ending in its utter breakdown, for the pus is a very infectious product and will harbour all sorts of bacteria. Formation of pus at the gums causes food to be mixed with this pus which then enters the stomach. Thence the infection spreads and deteriorates the whole system. Now one disease and then another disease may appear—the root cause of all being this pus.

Ordinarily, pain in the tooth may be treated first by gargling with hot saline water. Painting iodine is often found to be efficacious. When toothache is intense counter irritation is likely to give relief such as pricking the gums with a sterilised needle. Chillies made into paste and applied on at the root of the tooth will give relief. Menthol dissolved in oil

PYORRHŒA HEADACHE INSOMNIA

is a good counter irritant and a reliever of pain. For pyorrhœa attention should be directed to the root cause. Constipation has to be removed and diet made simple and nutritive. The gums should be strengthened by gargling with alum solution. Iodine in dilution should be painted as often as possible. The gums should be rubbed with freshly burnt charcoal reduced to fine powder. Charcoal will remove offensive material wonderfully well. The mouth should be thoroughly cleaned after every meal and digestion should be improved by taking 10 drops of papaya milk and also some soda bicarb after every meal.

Headache

It is a distressing symptom. Mostly it is due to digestive disorder. Nervous disorder also brings in headache. In any case the bowels should be moved by an enema. This one step often leads to relief.

Defective diet and constipation or dyspepsia may bring in headache. For that the causes should be removed. A cold bath after an enema will do good.

Counter irritants are useful. Menthol in oil should be rubbed on to the affected area. Sedatives are of course useful. Potass bromide or chota chandra will soothe the ache and put one to sleep.

Here one word may be said about insomnia which is allied to headache. The causes are often the same although mental disturbance is a fruitful cause of insomnia. The treatment should be for correcting

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diet and removing constipation. Massage followed by a cold bath will often induce sleep. Sedatives such as Potass bromide and chota chandra are useful.

Pain in boils, sprains etc. should be treated as in inflammation. Boils may yield to hot boric compress or poultice. If early, the boil may subside or if it will not subside it will quicken the ripening or formation of pus, the removal of which will allay suffering. The subject is dealt with more fully in the chapter on Accidents and Minor Surgery.

DYSPIA OR DIFFICULT BREATHING

Breathing or respiration gives a fair indication of what is wrong with the system and provides means for diagnosing and treating certain diseases

In normal breathing the inspiration is prolonged and the expiration is short and there is a good pause after which inspiration begins again. This process is repeated 16 or 18 times in a minute in healthy adults. In children the rate is much quicker. This is described in the chapter on Post Natal Care. Respiration bears normally 1 to 4 ratio to pulse. If pulse beat is 72 per minute, respiration would normally be 18 per minute. In asthma, lung and heart diseases this relation is disturbed.

In asthma the duration of inspiration and expiration are reversed. There is difficulty of breathing and there is a sense of suffocation. The patient sits up in bed or attempts to throw open the window as if to get more air and fixes his arms to bring all the respiratory muscles to action. The respiration is slow and inspiration is short while expiration is prolonged. Both inspiration and expiration are accompanied by loud wheezing sound which can be heard at a distance from the chest. The chest remains expanded and at inspiration there is very little further expansion. There is a sucking in of the supraclavicular and lower costal regions.

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In asthma, the muscle fibres in bronchial tubes are in spasm. Datura relieves spasm and does invaluable good in asthma. Datura leaves are dried and then smoked as an ordinary tobacco. This gives relief. The spasm is toned down. If the patient is unable to smoke he may be placed under a curtain where a pot containing datura leaves in a smoking state may be placed. The patient may thus be fumigated with datura smoke. Datura leaves in powdered form may be mixed with some potass nitrate or saltpetre and also some powdered charcoal. This will keep the datura leaves smoking slowly according to the portion of saltpetre added.

The asthmatic patient knows which diet helps him and which goes against. He should regulate his meals accordingly. Sedatives are of use Chota chandra may be given by the mouth in 30 grains doses as also potass bromide in 15 to 30 grains doses

In pneumonia the pulse-respiration ratio is disturbed becoming 3 to 1 or even 2 to 1 instead of normal 4 to 1. Both respiration and pulse rate are increased A puff or grunt accompanies each respiration while the pause follows inspiration instead of expiration

In pleurisy the characteristic is creaking, rubbing or leathery sound heard towards the end of inspiration and sometimes at the beginning of expiration. This can be heard by the use of a stethoscope. In severe cases the rubbing can be felt by the palm of the hands.

DYSPNÆA IN LUNG DISEASES

In bronchitis the breathing movement of the chest is diminished. The percussion note is diminished at first and afterwards may become completely dull. The thrill of vibration on speaking, perceptible through the stethoscope becomes less than normal. In some cases local limitation of the movement of the lungs and flattening with displacement of the heart to the affected side may be apparent on inspection.

In these diseases when the disturbing causes are eliminated, breathing comes back to normal. Medical aid does some good. In diseases of the lungs, attempts should be made to bring them back to normal. In bronchitis, pneumonia and pleurisy hot fomentation and counter irritants help the resolution of the obstructing phlegm or soothing of spasmodic condition or tension in the lungs, bronchi or pleura. Expectorants are also useful in early stages where sputum is thrown out with difficulty. Vasaka is an all round expectorant and also is an antispasmodic. Dry vasaka leaves in 30 grains doses or 5 tablets per dose thrice daily are useful.

When breathing is very slow, artificial stimulation of the heart may increase both the pulse rate and the rate of respiration. If the heart is strengthened, respiration also is quickened. When the respiration is very quick but feeble then the heart also will be found to be feeble. Strengthening the heart muscles is necessary then. This can be done by giving 20 to 30 grains doses of powdered arjun bark or 5 arjun tablets thrice daily.

VOMITING

Stimulation of the vomiting centre in the medulla oblongata directly or through a reflex is the cause of vomiting.

Various emotions particularly those of disgust, aversion and fear may cause vomiting. The memory of a particular event which caused vomiting, may induce vomiting. The vomiting centre in the brain may be affected by pressure due to a tumour or injury in the brain or due to accumulation of fluid as in meningitis. The vomiting of headache is also due to irritation of the central nervous system. When a man gets an injury or a blow on the head, vomiting will indicate that the shock has been of sufficient intensity to increase the intracranial pressure. It will put one on the guard and serve as a danger signal. In general, it may be said that attacks of vomiting unaccompanied by any pain or disorder in the abdomen have their origin in the central nervous system. Such vomitings are frequently associated with headache.

Irritation of the vomiting centre in the medulla or of the mucous membrane of the stomach causes reflex stimulation of vomiting and is the commonest cause of vomiting. Abnormal and irritating food, overdistension with food or if food is allowed to remain abnormally long in the stomach, may cause

CAUSES OF VOMITING

vomiting Painful stimulation of visceral nerves as in biliary or hepatic or renal colic or intestinal obstruction, causes vomiting If there is too much acid secretion in the stomach, it will cause irritation and result in vomiting If therefore vomiting leaves a sour taste in the mouth, drinking of alkaline draughts will relieve the distress and nausea If there is too much bile present in vomiting, then the irritating cause is over-alkalinity Some sour fruit juices like lemon or tamarind will remove the cause and effect a cure Sea sickness, train or boat sickness may be both due to the disturbances of the labyrinth or of the stomach Vomiting in the early months of pregnancy is due to irritation from the brain

If vomiting is due to a general irritating condition of the abdominal organs, iodine in one minim doses acts beneficially in stopping it But in certain cases, as in cholera, it is the toxic condition due to bacteria that causes vomiting There is need then for removal of the bacteria and also of the stopping of toxæmia due to the presence of living and dead bacteria These have to be removed Calomel in $\frac{1}{2}$ grain doses with 10 grains of soda bicarb repeated four or eight to sixteen times during a day according to gravity, is effective in removing the cause Calomel is also useful in allaying irritation in gastric and liver troubles and thereby stopping vomiting.

Counter irritation of the muscles of the abdomen by application of heat as in fomentation or mustard plaster or a plaster of chillies is useful in

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checking vomiting due to irritation of the abdominal organs.

Introduction of solid food often checks nausea when in certain diseases nothing can be retained in the stomach. Solid food may be given provided there is no abdominal inflammation. In sea sickness avoidance of liquid food has a great effect. In such vomiting the root cause lies in the semi-circular canals in the ear. These canals are delicately framed instruments not only helping the perception of sound vibrations but also of use in locating one's position in space. Undulatory disturbance of the canals as is caused by waves in a boat or movement of the train in some persons, reacts on the vomiting centre. In such a case the cause has to be removed or the stomach may be kept devoid of liquid so that the rolling motion of fluids in the stomach along with the motion of the boat or train may cease. Sedatives serve to keep down such nausea. Bromides or chota chandra may be of use.

Cocoanut water has a soothing effect on the stomach and vomiting caused by irritation of the stomach may be relieved by drinking green cocoanut water in place of plain water.

Vomiting in fevers :—Vomiting may be regarded as a general symptom at the onset of febrile condition. If rigor is present then almost invariably undigested food will be thrown out. The more so the less the interval between the taking of food and the rigor. In rigors of malaria there is vomiting. In meningitis

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and head injury vomiting is persistent. In pneumonia the onset is generally accompanied with vomiting along with chill and shiver. In thirty per cent cases of pneumonia there is onset with vomiting. Similarly in diphtheria the onset is marked by a general feeling of illness, difficulty in swallowing, headache, disinclination to take food and vomiting. Here the diagnosis is only possible on the appearance of mucous patches in the throat.

In appendicitis vomiting is an usual early symptom along with the presence of uneasiness, flatulent distension of the abdomen, constipation or diarrhoea. There is of course the inflammation in the right iliac region which may extend up and down.

In small pox the onset is characterised by severe chill, frontal headache, severe pain across the loins and quick rise to high temperature. Along with these there are delirium, convulsions, nausea and vomiting, particularly in children.

The onset of sunstroke or heat stroke is marked by uneasiness, a rapid rise of temperature and vomiting.

In abnormal and irritated condition of abdominal organs, vomiting is at once a symptom and a natural effort at cure. In gastritis, gastric and duodenal ulcers there is vomiting, in biliary and renal colics vomiting is a great feature and also a great comfort. In obstruction of the pylorus, in too acid gastric secretion and in obstruction of the intestines vomiting hoists the danger signal and at the same time offers a path for cure. When the stomach and intestines

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are highly irritated, as in cholera or in poisoning, vomiting becomes a special feature. In diseases of the liver when that organ is not able to manufacture the proper juices for digestion, the notice comes in the form of vomiting.

In biliary and renal colics pain causes vomiting. The contents of the stomach are thrown out and there is some relief on account of the withdrawal of the pressure of the stomach on the organs. But there is something more vital than this. The effort of vomiting causes exhaustion and relaxation. This relaxation is exactly what is needed in the ducts getting injured by the obstruction. Obstructions set up irritation and the muscles of the passages get stimulated, constrict and tighten the passages which are more injured by pressure from embedded particles of gall stones or urates. Relaxation is what is needed to allow obstructing particles to pass through and vomiting brings in this relaxation which soothes pain and gives relief. Treatment of colics is indicated under pain.

When the pylorus is obstructed by inflammation or from other causes, the contents of the stomach cannot normally pass out into the intestines. The result is that food accumulates causing dilatation of the stomach. Thereby food gets lodged and a portion always remains as residuum in the stomach. The stomach is not meant for harbouring food for more than a few hours. If food is not cleared out of the stomach in time, rotting sets in causing all sorts of

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mischief Herein vomiting comes as a measure of safety The unhealthy accumulation is gushed out The more the stomach is dilated, the more frequent is the vomiting In such vomiting food taken two or more days previously, is thrown out According to the period of stay the vomit is sour or rancid

There are some children who are born with a dilated stomach They throw off milk by vomiting and the character of vomiting is that of a projectile Sometimes sour and rancid milk is thrown out In these cases the stomach is to be washed out to free it from the putrefying irritating contents The next step is to attempt to heal by giving liquid food in moderate quantities If the pylorus is inflamed it has to be treated by taking internal antiseptics For dilatation of the stomach nux vomica and soda bicarb are to be taken so that the muscles involved may be toned and the pouch of the stomach may not remain dilated

In gastritis and gastric ulcers vomiting gives notice of the condition of the stomach Soda bicarb is to be taken in large doses to neutralise the acid secretions and food should be regulated In gastritis the regulation should take the form of adherence to fluid diet In ulcers however, the treatment is to be to keep the stomach always occupied with some soft food so that the irritating gastric juices may not come in contact with the injured tissues of the stomach walls This treatment combined with taking soda bicarb in large doses after every meal effects a cure

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Obstruction of the intestines also causes vomiting. Vomiting accompanied by pain, absolute constipation and collapse are the symptoms of the intestinal obstruction. Vomiting is preceded by nausea and severe retching. Vomiting comes in about an hour after the pain but it may be delayed. Vomiting gradually increases in number and from the 2nd to the 4th day becomes faecal in character. This faecal character is not due to the contents of the intestines beyond the obstruction forcing its way out. It is due to secretion above the obstruction accumulating and overflowing to the stomach where it causes vomiting.

In cholera, at the diarrhoeic stage there are colicky pain in the abdomen with loose bowels, headache and vomiting. At first all the food contents are thrown out, then the vomit becomes entirely watery. Treatment consists in giving calomel in $\frac{1}{4}$ grain doses with soda bicarb 15 to 20 grains every 15-30 minutes.

In liver disorders there is often jaundice and vomiting. Treatment should be directed towards keeping the bowels open and increasing the secretion of bile and also keeping the gut aseptic. All these are accomplished by administration of magnesium sulphate in one or two drams doses combined with calomel $\frac{1}{4}$ grain and soda bicarb 10 grains doses, several times a day. Soda salicylate in 10 to 15 grains doses with an equal amount of soda bicarb is efficacious.

Then again in nervous diseases the vomiting centre is affected and the patient suffers from vomiting.

VOMITING IN DISEASES

In epilepsy after the convulsion has come, vomiting may occur. As it however occurs during the period of unconsciousness there is a risk of the vomit being drawn up in the larynx and of causing asphyxia. In hysteria vomiting often occurs immediately after meals. It is an effortless vomiting and is not accompanied by nausea. In early pregnancy vomiting is very common occurring only in the morning. But if there is vomiting after every meal and not confined to the morning, if the vomiting persists after the eight weeks, then it is usual to regard it as of toxic origin. It has however also been found that vomiting of hysteria with all the toxic symptoms such as dry black tongue, rapid pulse etc disappear in one or two days by psychotherapy in the form of explanation and persuasion. No medicines are then necessary.

Vomiting associated with eclampsia or fainting fit of pregnant women is different from this. In hysterical vomiting either in hysteria or in pregnancy the patient should be kept in bed. She should be explained that her stomach has acquired a bad habit which must be given up. In many cases education rapidly leads to complete recovery. This is very important as the distress of vomiting of pregnant women makes life a burden to them, so severe it is in some cases.

Vomiting resembling that of cholera also occurs in arsenic poisoning. Vomiting is then accompanied by severe burning pain assuming later a gripping or colicky type with watery stools. At first the vomit

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will contain any food that might be present. There is often much mucus. It becomes watery and gets tinged with blood. Treatment is described under poisoning by arsenic.

Vomiting occurs in irritating and dry coughs. The irritation in the larynx, trachea and bronchi sympathetically causes vomiting and this helps obstructing mucus to be brought out by relaxation. Here again vomiting is a warning and also a cure

FEVERS

Fever a Symptom.—Fever is not a disease but a symptom. Infective organisms cause disturbance in the body and fever is an evidence of the fight that is going on and of nature's attempt to throw off the toxins. High temperature may be due to other causes than infection. It is well-known that the temperature may rise to 101° or 102° F by muscular exercise and such rise of temperature is no fever. The rise of temperature in case of heat stroke is also not fever.

Generally there is feeling of chill before a fever comes. In certain cases the chill is severe as in malaria. The patient shivers and this is known as rigor. There is an effort on the part of the system to raise the internal temperature. This, it does by preventing dissipation of heat through the skin by constricting the cutaneous blood vessels. The patient complains of cold, his teeth chatter, he shivers although his temperature is rising. This is the phenomenon of rigor during the onset of pyrexia. The production of heat is increased, the loss of heat is diminished and the balance is disturbed. The heat of the body rises. With greater rise of heat the feeling of cold disappears and symptoms appear which are common when the body is subjected to heat.

Three stages are recognised in acute fevers although all fevers, particularly infective fevers do

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not markedly exhibit these stages. The first stage is the stage of rigor pronounced or suppressed. The second stage is fastigium or the stage in which the highest temperature is reached. The third stage is a stage of decline or defervescence in which the fever falls by crisis or by lysis. When the remission of fever is sudden it is called crisis ; when it is gradual it is called lysis.

For a time the invading microbes remain working in the system unobserved and without producing any symptoms. This is known as the incubation period. When the microbes have passed through this stage they create the first febrile stage. The microbes exert a stimulating influence upon the nervous control of the muscles, particularly the muscles of the blood vessels of the skin. This produces shivering and the skin takes the familiar appearance known as of goose skin.

In the second stage the nervous control of heat-production centre is disturbed. There is a daily variation of temperature. The blood vessels owing to high temperature naturally get relaxed and the skin is therefore flushed. In most cases the toxic effect of the microbes on the central nervous system partially paralyses the sweat glands and therefore there is little sweating. The skin becomes dry and hot. But this toxic effect is not confined to the skin only. The other excretory organs also are adversely affected. Urine becomes scanty and coloured and bowels become slow to move. Heat production is not

STAGES OF FEVERS

equalised by heat dissipation and the balance of heat is indicated by high temperature which is maintained. In some cases rashes appear which characterise certain infections and these are related to the particular toxins created by bacteria.

The third stage is the stage of declaration of results. The protective mechanisms of the body have been fighting during the first and second stages. Now the fight is over. If the protective mechanism is able to create sufficient antitoxin so as to neutralise the toxin, things tend towards the normal. The loss of heat is enhanced by sweating and thereby the temperature falls. This is remission. The struggle becomes over. While on the contrary, if at any stage the defensive mechanism gets overwhelmed by the toxins, complications arise ultimately ending in the dissolution of the body.

The rise of temperature is a part of the defence. High temperature either kills or attenuates the activity of the microbes. This being so, it may be argued why is quinine given in malaria? The reason is that quinine is given to kill the malarial parasites. But certainly the use of antipyretics or substances which reduce the temperature would affect the fighting power of the system adversely. But not so with cooling the skin by sponging or by bathing in fevers. While high temperature helps to kill bacteria it acts adversely on the skin which is the largest organ for reception of stimuli. The skin very greatly affects the nervous system and therefore the whole system.

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The cooling of the skin does good not merely by the cooling down of the body heat but by improving the nervous condition. The improvement produced by sponging is out of proportion to the reduction of temperature.

Sponging, bathing and wetpack are the methods used in fevers. They are great aids to nature's efforts for cure by helping elimination and invigorating the nerve endings. These stand entirely on a different line from antipyretic drugs. While sponging helps the struggle, antipyretics often serve to break down the protective mechanisms evolved by the system in response to the attack from infective micro-organisms. When the temperature rises above 103° or 104°F, it becomes imperative to bring down the temperature. At very high temperature or during hyperpyrexia the heart is very adversely affected and there is a risk of sudden collapse. High temperature should in all cases and without exception be lowered by the liberal application of ice-cold water by way of bathing, sponging or wet pack or immersion. Neglect to reduce temperature for fear of the patient's catching cold or some such imaginary thing may be quickly fatal.

There are some features common to all fevers and due attention to them may serve as a guide for treatment of fevers.

The digestive system is disturbed. The various juices that are necessary for digestion of food are not discharged in proper quantity or quality. This

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points to the necessity of giving rest to the digestive system. In normal persons stoppage of food for a few days will do no harm On the contrary, it will do immense good Refusal of food during ailments instinctively comes to animals In fact, in domestic animals often the first indication of their being anything wrong with them is their refusal of taking food. In man, that instinct has been subdued artificially so much so, that not only there is an artificial hunger calling for food but there is a feeling of intolerance against any restraint put by others. The hunger in fevers is a false hunger It is merely a call of habit The animal instinct for refusal of food in disease has got to be cultivated If it were cultivated, less doctors would be necessary and certainly less medicines in keeping persons in health

In fever, the normal ratio of salt and water in the system is disturbed and also acid-alkali ratio resulting in acidosis Acidosis is supposed to be produced by an imperfect oxidation of fat. The excretory systems are also disturbed When there is the greatest need of elimination of toxins through the various excretory channels, these also get out of order We have already seen that sweat glands do not secrete and there is no sweating during rigor and little during the second stage of fastigium While the system is reverting to normal during remission or defervescence there is profuse sweating During fevers urine becomes scanty and constipation or stagnation of the movement of bowels occurs All these excretory

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channels have got to be kept open and stimulated during fevers. The skin should be massaged and then sponged or bathed. This serves to excite the sweat glands to action and whatever poisonous debris be accumulated in the intestines, are helped to be removed by sponging or bath.

Plenty of water has to be taken in order to stimulate the kidneys to action. The kidneys get irritated because they are taxed by having to deal with an abnormal quantity of proteins. We do not know very much about the working of the defence mechanism but it is found that in fevers protein disintegration products like urea, creatinin and purine bodies are largely formed and these must be eliminated through the kidneys. Urine becomes coloured and charged with these bodies. Relief lies in taking large quantity of water during fever. In fact, there is a natural response to this call for water and the patient feels thirsty. Thirst by the way is not due to the call from the kidneys alone. Although sweat glands do not operate and there is not great loss of water by evaporation through the skin, yet breath carries most moisture on account of higher temperature and thereby water in the system is diminished. To make up for this loss there is thirst or call for water. Even if there is no thirst, the patient should be induced to take plenty of water to help elimination of toxins.

High temperature and chemical changes in the blood react upon the respiratory system and the rate

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of respiration is increased Increased heat means more internal combustion and production of more carbon dioxide in a unit of time The increased gaseous products call for greater action of the lungs to deal with them The respiration rate is therefore increased In tuberculosis the rate increases by 32 per cent, in typhoid fever by 48 per cent and in malaria by 60 per cent above the normal

If by cold application the action of the skin is stimulated, the distress of hyperpyrexia is diminished and along with it also respiration tends to come to normal

Bowels get constipated in fevers Aperients may be given Where the bowels are loaded, they have got to be emptied Purgatives have to be cautiously used as in a deranged system showing fever, further derangement may be brought about by indiscreet use of purgatives. But they have to be given in many cases Myrobalan is a mild and harmless purgative Castor oil is another. Magnesium sulphate is a saline purgative which has the property of extracting the serum from the blood and discharging it The stools become watery This induces great weakness Unless there is special reason for removal of fluids or for helping the action of the liver, magnesium sulphate need not be used In liver troubles attended with fever both calomel and magnesium sulphate are irreplaceable and have to be used

In fevers the general course of management should be to cleanse the bowels with the help of an

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enema. This does not involve the use of any medicine whatever and at the same time helps cleaning of the system. Enema may be taken as a routine course during fevers when the trouble is not minded. Plain water or saline water may be used for an enema. Certain soaps are irritating and it is better to avoid soaps. The temperature of water should be that of the room. Where there is high fever, water cooled perceptibly should be used. In weak patients with fever, water should be tepid. Where enema is daily used water at 98° F or at normal blood heat is to be used. A No. 10 catheter should be attached to a douche nozzle and introduced fully through the rectum. In this way the end of the catheter will go to a certain length in the colon and greatly help clearance of accumulations. In typhoid, malaria and in all other fevers, enema should take a very prominent place in treatment.

In chronic diseases like tuberculosis the rise of temperature need be seen in its true light. The rise here, as in other cases is an instance of the attempt of nature to counteract the work of micro-organisms causing tuberculosis. Higher temperature than normal in tuberculosis is an indication that infection is active. In this particular instance instead of making the patient rest all the time in bed, he should be given light exercise. Light exercise and exposure to sun and open air increase the resisting capacity and thereby help recovery. It is true that undue muscular exercise would be most dangerous in this

SPONGING IN DELIRIUM . AIR IN LUNG DISEASES

disease as muscular exercise reacts, specially if the disease is in active state. At the same time it must be remembered that prolonged rest in bed will diminish the resisting capacity even of a healthy man

When delirium is present in fever indicating nervous disturbance, attention should at once be directed to the great centre for reception of nerve stimuli—the skin Sponging with cold or ice-cold water is the safest treatment. Internal temperature may not be reduced by sponging but the skin temperature is reduced and the nerve centres get refreshed and obtain chance of working normally It would be apparent therefore that in distress of fever and in delirium mere pouring of water on the head of the patient or putting a strip of scented moist rag on temples are of little use The very large surface of the skin all over the body demands cold application If cold is applied on the skin, nerve symptoms will be allayed

Fevers in Bronchitis, Pneumonia and Pleurisy

In fevers connected with lung diseases, plenty of air should be provided for by keeping doors and windows open It has been observed that in hospitals death rate from pneumonia has diminished simply by providing for greater ventilation in the sick rooms Bronchitis, pneumonia, pleurisy and phthisis all have coughing as a symptom. Coughing produces strain The strain should be avoided

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Accumulated sputum which is thrown out by coughing is no good thing to remain within the organs. It not only chokes the air passages and contact surfaces but provides toxic substances for absorption into the system if not thrown out. In these diseases therefore attempt should be made to help nature by the administration of expectorants. Vasaka will be very servicable. 20 to 30 grains dry leaves in powder per dose mixed with water and syrup may be given. Substances containing essential oils or spicy substances, if made into syrup form good expectorants. Here is a combination.—

Vasaka leaves, cubeb, ginger and black pepper. All the items or as many of them as are available are taken in equal quantities, cleaned, pounded and boiled with water for an hour replacing evaporated water by further addition during boiling. For one dram of mixed substances two ounces of water are to be taken. The extracted liquid is strained and then again brought to boil with the addition of half its bulk of sugar. This syrup if taken tepid in half ounce doses every 3 hours will be effective as an expectorant.

Garlic is of great use. The juice is to be mixed with water and drunk 4 to 8 drams of the tuber may be taken daily. Quinine is useful in all these acute cases.

The chest in these diseases should be taken care of. Counter irritants in the form of plasters, poultice and anodynes are to be applied when there is pain in chest as explained under heading Pain in Bronchitis. Iodine in one minim doses checks infective processes in

MALARIAL FEVER CINCHONA FEBRIFUGE

internal organs Where possible 1 c c of iodine may be injected intravenously Garlic is very helpful in counteracting the forces of infection as it is a powerful internal antiseptic

Malarial Fever

Malaria is caused by the bite of mosquitoes of a particular kind (*Anopheles*) infected with malarial parasites The characteristic of malarial fever is that it comes with rigor in acute attacks The rigor is very marked The shivering and chattering then cause great distress It is periodic Malarial fever may attack on alternate days or on every third day or it may come every day after remission The stage of rigor is followed by nausea, vomiting and heat The skin begins to burn with the rise of temperature when all the extra coverings heaped during rigor have to be thrown off The temperature rapidly comes down to normal with profuse sweating within 4 to 6 hours The disease yields to cinchona

In malaria the parasites causing the disease have got to be enfeebled and killed So far as we know, of all drugs, cinchona alkaloids do this work best. The action of cinchona is not thorough nor is it successful in every type of attack of the malarial parasites But this is the most effective specific available against malaria cinchona febrifuge in the form of tablets with citric acid should be given along with soda bicarb, 10 to 15 grains daily for days after an attack Those

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who have suffered from malaria should protect themselves against relapses during the malarial season, July to November by taking 10 grains of cinchona twice weekly. The action of the skin should not be neglected Bowels should be kept moved if necessary by the use of myrobalans

Malaria, if allowed to go untreated, causes a series of mischief and ultimately breaks down all power of resistance. The liver cells are adversely affected by the parasites and get injured. In order to get the required service out of the damaged organ the bulk of the liver is increased. This is enlargement of the liver. The enlargement is checked by taking iodine one minim in one ounce of water and on painting iodine over the tender part. Magnesium sulphate acts beneficially in the torpid liver.

The enlargement of the spleen is also a feature of malaria. There is a call for its incessant exercise to an extent which it is incapable of performing. This results in its enlargement. It is useless to try drugs to reduce its enlargement. The cause should be removed to effect a change.

Blackwater fever is a type of malignant malaria. It is characterised by red or black urine ; the colour of urine being due to blood. Red blood corpuscles get broken up by the disease. It is a very dangerous disease upsetting the system in course of a few hours. One point of great importance with regard to this is to note, that it is said to be brought on by insufficient use of quinine in malaria. If attacks of malaria occur

BLACKWATER FEVER . KALA-AZAR

periodically and if they are not treated properly with quinine and if after that in an attack urine turns red or black then blackwater fever is to be diagnosed. The fever comes with rigor as an ordinary attack of malaria. There is pain in the loins. Red urine is the first indication. Rise of temperature continues. There is nausea. Bilious vomiting is a troublesome feature. The urine gets deeper tinted to black. Destruction of blood corpuscles goes on and the patient in a few hours is turned yellow and this increases in intensity with the progress of the disease.

One thing to do in this disease is to refrain from giving quinine. Quinine or cinchona enhances haemolysis and brings the end nearer. In malaria quinine is given as a matter of routine. If the fever begins with the characteristic rigor malaria is diagnosed. But in blackwater fever there is no premonitory stage. The fever begins like ordinary malaria. Only when the urine gets red or black, blackwater fever can be diagnosed. Once the characteristic urine is passed in malaria, quinine administration should not be thought of. Administration of cinchona or quinine may be quickly fatal in blackwater fever. Soda bicarb should be given in the form of plenty of alkaline drink. Calomel in fractional doses is useful. Sponging and bath are helpful.

Fever in Kala-azar

Kala-azar is a disease like malaria caused by bites of a fly named sandfly. The parasites are put into

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the blood stream from the bite and they increase in number causing kala-azar. Kala-azar at one time was a wholly fatal disease. Persons attacked with this disease dragged on for sometimes and afterwards succumbed, the immediate cause of death being any of the complications caused by the disease.

The characteristic of kala-azar is that the spleen becomes rapidly enlarged and turns hard like a piece of brick and reaches down to the iliac region. The skin becomes black. The fever rises and falls twice daily and continues for weeks and months. In most cases the patient does not mind the fever. Even when the temperature is 102°F the patient does not feel anything abnormal but would be at his usual vocation. There is gradual emaciation, the anaemia however is not as pronounced as in malaria. The resisting power of the patient gets diminished and diarrhoea, dysentery, bronchitis, broncho-pneumonia and tuberculosis are common causes of death. The disease may last one to two years in chronic cases.

Cinchona or quinine are useless in kala-azar. The only treatment in kala-azar is the intravenous injection of 2% solution of potassium or sodium antimony tartrate. Some newer organic compounds of antimony such as urea stibamine, neostibosan, stibulea, stiburamin etc are now available which are more efficacious and better suited to cases with heart complications. The patient should be given a complete course of injections.

INFLUENZA

Fever in Influenza

It is a common disease and in milder form is always present here and there. In milder form it is like common cold, there is burning sensation in the nose and water begins to flow from the nose. The temperature rises rapidly and is a little higher than in common cold. The chief characteristic differentiating it from common cold is that headache is intense and there is great aching pain in the loins and limbs.

Treatment begins with the nose. Saturated solution of thymol in water should be used for occasional sucking up by the nose. This may be done every hour. So efficient is this treatment that in many cases an attack proves abortive if the nostrils are attended to at the very first appearance of symptoms. Quinine or cinchona in 2 grains doses should be taken every 3 hours from the very onset. The skin should be sponged. Hot fluids should be given for drinking. Bowels to be moved by an enema or an aperient such as myrobalan should be taken. The patient should be confined to bed or the disease may turn to be serious. Garlic is very useful.

Influenza in epidemic form although the same disease, assumes a terrible character. The infection spreads quickly, lung complications appear inducing difficult breathing and cyanosis and the disease proves fatal in most cases. In 1918, it nearly decimated whole races of mankind in some areas. Treatment is symptomatic.

HOME TREATMENT OF SYMPTOMS

Fever in Dengue

Here the fever sets in with bone-breaking pain in joints and limbs. The temperature rising from 102° to 105° F. There is distressing headache. The skin is flushed and measles-like rosy rashes appear on the skin. They appear first on the dorsal surface of hands and feet and spread from there to forearm and leg. Itching follows.

No medicinal treatment is necessary. General treatment with the help of water and regulation of diet should be undertaken as described. The disease is rarely fatal.

Fever in Measles

The fever begins with signs of cold, sneezing, watery eyes and dry irritating cough. Apparently it may be mere cold. If accompanied by pain in limbs it would have indicated influenza. The characteristic symptom is the appearance of the skin rash which is visible on 3rd or 4th day after fever. But even three days before the appearance of the rash, mucous membrane of the mouth shows minute superficial specks of bluish white rings with a tendency to aggregate in small clusters.

When the rash appears or sometime before it, temperature rises to 103° or 104° F. The respiration becomes hurried. The discharges from the nose become less watery and more purulent. Temperature

COMPLICATIONS OF MEASLES SMALL POX

begins to lower down when the rash begins to fade. In fever respiration is disproportionately rapid

Many complications arise with measles Those of the respiratory tract are the most important and most serious. Pharyngitis, laryngitis and bronchitis may appear from the onset If the temperature does not come down with the subsidence of the rash then broncho-pneumonia is to be suspected It may assume a very dangerous form Measles favours the development of tuberculosis which may have been latent in the glands or lungs Whooping cough and diphtheria occur in close association with measles

It is difficult to segregate cases of measles for the disease spreads infection before it is diagnosed. Ample fresh air should be provided for The patient should have change of clothing Children should be bathed twice daily without exposure, so also adults Where bath is not possible, the body should be sponged several times in the day Warm sponging helps the appearance of the rash in a suppressed case The mouth should be kept clean and the bowels kept moved Diet should be fluid and very light

Fever in Small Pox

Small pox is an acute specific disease Fever is very distressing in small pox The temperature rises suddenly from 102° to 104° F with rigor, severe headache, nausea, vomiting, backache and in children with delirium and even convulsion Fever comes in

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two stages. The first attack of fever ends as the eruptions mature. There is a recurrence of fever with the onset of pustular stage. Infection takes place through the respiratory passages and may be direct or indirect. The infection may spread by direct contact through carriers or even air may carry the infection. One attack generally renders the patient immune for several years. Upon this fact depends the success of vaccination. But vaccination means introduction in the system of pus of cows. Apart from this, there is risk of complications arising which may injure health. Care should be taken to segregate the patient. Treatment should be as in the case of ordinary fevers. The patient should be bathed in water twice daily or sponged. If the temperature is high it should be brought down by wet pack. Bowels should be kept moved. Cleanliness should be preserved specially during the suppurative stage. The eyes should be washed with antiseptic boric lotion. During suppurative stage neem water is useful. Where the patient can tolerate, garlic may be given as an internal antiseptic. Plenty of water should be given to drink. Diet should be confined to liquids and the less diet the better.

Fever in Chicken Pox

Chicken pox differs from small pox in the eruptive papulae appearing with water on their apexes. It is highly contagious and the patient should be segregated.

CHICKEN POX ERYSIPELAS

Fever rarely rises to higher temperature than 103° F Treatment and precautions should be as in other eruptive fevers The disease is not fatal

Fever in Erysipelas

It is a specific infective fever. The fever comes abruptly often with rigor and the temperature rising to 102° or 103° F. In severe cases there are aching pain in the body and headache. The fever and distress of toxæmia may induce delirium Ordinarily the site of infection gets inflamed. There are tightness, swelling and pain The area spreads rapidly and becomes oedematous.

The swelling travels from place to place When the toxæmia disappears, fever passes off and the swelling also disappears Treatment consists in painting iodine over and surrounding the swelled part The affected part should be under a cold compress of saturated solution of magnesium sulphate The compress should be a continuous one being bandaged at the site with padding and a piece of plantain leaf on to keep off evaporation As the liquid dries, more solution should be allowed to be absorbed by the dressing

Internally iodine in one minim dose should be given three or four times daily. Iodine injected along the border of swelling is very helpful Bowels should be kept moved by the help of enema or aperients like myrobalan. For internal antisepsis

HOME TREATMENT OF SYMPTOMS

garlic should be taken. Diet should be liquid, preferably diluted dahi. The patient should be given plenty of water to drink and should be sponged several times daily to keep the skin in condition.

Fever in Diphtheria

It is an infectious disease of which the seats are the fauces and the larynx. The microbes form membranes over the inflamed sites. The membranes are of glistening and pearl-grey colour. Fever is moderate and nasal discharge may or may not be present. The fever is disproportionate to the gravity of the disease. Respiration is obstructed and deglutition becomes difficult. While the membrane covers the larynx and creates asphyxia, the blood pressure becomes low and circulatory failure makes the situation very grave. Death may ensue from respiratory failure by slow asphyxia. The disease is most common in children increasing up to the fourth year of life after which it progressively declines.

Treatment consists in removing the toxic condition by killing the microbes. Paints of milk of papaya in honey are useful in dissolving the mucous patches. Garlic juice painted many times at intervals keeps down the virulence of the microbes and often succeeds in destroying them. Now a days diphtheria anti-toxin is available for intramuscular injection which is of great efficacy in combating the disease and effecting a cure.

DIPHTHERIA . TYPHOID FEVER

The bowels should be kept moved Tepid water should be given in plenty to drink and the action of the skin should be stimulated by sponging Every case of inflamed throat of children should be treated with suspicion as a probable case of diphtheria Treatment should be begun as early as possible The infection spreads easily at home and schools where convalescent children may attend Every precaution should be taken to segregate the patient and dispose of the secretions of the patient so that infection may not spread The swabs used for painting the throat, the sick room utensils and linen may all spread infection through contact

Typhoid Fever

It is an infectious fever caused by typhoid bacilli which attack the intestines The fever is mild at first and has distinct characteristics It is attended by a redness on the edges of the tongue and sometimes by eruption of rose spots on the 7th or 8th day, abdominal discomfort and bowel disturbance The temperature rises at noon during the first week Every day there is a graduated but definite higher temperature rising by a degree or so The temperature looks like ascending steps of a ladder in the chart and is called step-ladder temperature

In typhoid the highest rise of temperature is in the afternoon with morning remissions , whereas in malaria the highest temperature is in the morning to forenoon

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The disease causes ulceration of the intestines and from there poisons the whole system. The attack begins insidiously, the patient not taking bed for a day or two. At the end of the first week there is a gurgling sound on the iliac region on pressure. The bowels are generally loose, sometimes however there is constipation. Urine is high-coloured and concentrated. Thirst and headache are chief complaints. On the second week the fever reaches its fastigium. The temperature at this stage is maintained at the same level with slight morning remission. Prostration increases. The distension of the abdomen which was slight in the first week becomes more pronounced. The pulse rate goes up to 112 to 140 per minute. There is a muttering form of delirium disturbing the sleep. Death may ensue at the end of the second week from toxæmia or perforation of the bowel or haemorrhage.

During third week improvement appears. Temperature begins to decline in the morning. The tongue becomes clean and appetite begins to return. During the fourth week the fever may entirely go, temperature remaining subnormal for some days. In some cases the fever may be prolonged.

When a fever is not malarial but is protracting, precaution should be taken on the supposition that it is typhoid. The preparation should be for three weeks' confinement to bed requiring delicate attention and nursing all through. Food should be restricted to whey. No movement should be allowed.

RHEUMATIC FEVER

The mouth should be kept clean by gargling with thymol water. There should be regular sponging twice a day Intestinal condition should be delicately attended to If the case is diagnosed early, then calomel in $\frac{1}{4}$ grain doses should be given four times daily as an antiseptic and aperient. If garlic is tolerated it should be given in $\frac{1}{2}$ dram dose of juice twice daily The tone of the heart should be maintained by regular administration of $\frac{1}{2}$ dram of arjun or 6 tablets twice daily Glucose may be given with drink during later stages if strength fails Iodine in one minim doses may be given as an antiseptic Iodine will counteract the tendency to vomit, if present

Rheumatic Fever

Rheumatic fever comes usually abruptly with a sense of chill accompanied by pain in the large joints of the hips, knees and ankles First one or two joints are attacked and then other joints are quickly affected. There are much pain and discomfort The joints are swollen and red The temperature rises to 102° or 103°F There is profuse sweating which has a peculiar acid smell. The heart also is generally affected.

The period of fever is from 10 days to 3 weeks The patient is to be put to bed The heart complication may necessitate restriction of movement even in bed The patient should be sponged several times

HOME TREATMENT OF SYMPTOMS

with tepid water and clothes also should be changed more than once on account of sweating. If the fever rises very high, wet pack may be applied

Soda salicylate acts as a specific in rheumatic fever cutting short the course of the disease and bringing relief. 180 grains may be given in course of a day divided into 7 or 8 doses and distributed during 24 hours. For a child of 12, half the dose may be given. With the decline of the fever and pain the dose may be lessened. Garlic is also useful for bringing down the pain.

Diet should be fluid, preferably milk mixed with barley or sago water combined with profuse quantities of alkaline drink. The bowels should be kept moved with the help of an aperient or enema

Algic Malarial Fever

Occasionally a severe attack of malaria is complicated with symptoms of cholera. Exactly all the symptoms of cholera appear attended with a high temperature

In such cases the temperature should be brought down by large doses of quinine. Intramuscular injection of quinine is most useful, for on account of vomiting quinine may not be retained.

Quinine quickly controls the temperature which should be given even when the temperature is high

ALGID MALARIA MUMPS FEVER REMISSION

Along with it calomel in fractional doses with Soda bicarb shall continue as in the case of cholera.

Fever in Mumps

Mumps is a very infectious disease. One or two of the parotid glands of the mouth swell and get tender and painful. The bowels should be moved by magnesium sulphate in full dose Diet should be very restricted , tepid milk with sago may do The patient is to be kept segregated, otherwise others are likely to be attacked The disease passes off in about 10 days

Fever Remission

During remission the temperature may quickly fall resulting in collapse Precautions should be taken to avoid disaster When the temperatuie shows the indication of falling in case of weak patients suffering from protracted fever, the heart should be strengthened by $\frac{1}{2}$ dram doses of arjun every two hours If there is sweating, it should be checked by rubbing the skin with dry starch powder in the form of arrowroot

Hot water bottles should be kept at the extremities and by the side of the patient to help maintenance of temperature

COUGH

Cough is the attempt to throw out sputum or any irritating material from the pharynx, larynx, trachea, bronchi and lungs. It has a different character in different diseases although the treatment is very nearly the same.

Cough in Bronchitis

In early stages the cough is dry, irritating and does not bring out anything. In a few hours or more the dryness is diminished and the cough becomes looser. Though there is no sputum at the commencement, as the cough loses its dry character sputum though scanty begins to appear. It is tenacious and is sometimes streaked with blood. The character changes quickly and after a time coughing brings out copious mucoid frothy sputum. With the progress of disease, cough lessens and the character of sputum changes to thick, becomes yellow and purulent. The pain and difficulty of coughing diminish as expectoration of sputum becomes copious. Cough lasts even after the fever disappears in about 3 or 4 days. Cough and expectoration continue for about 10 days. During the last period cough is only present at night and in the morning and then ceases.

COUGHS IN RESPIRATORY DISEASES

Cough in Pneumonia

There is cough with the onset of pneumonia in which the rise of temperature is higher than in bronchitis. The cough is short, dry and irritating but the typical feature is the great pain that the cough causes in the affected side on account of pleurisy. The sputum is scanty and tenacious at first but after a time becomes more abundant. Yet it remains viscid. The sputum of pneumonia contains some red blood with mucus and therefore appears rusty.

Cough in Influenza

The disease originates like a common cold or coryza with inflammation of the nasal mucous membrane. The infection then travels down to the throat and may cause swelling there. Then it travels further down in trachea and reaches bronchi and lungs and thence the pleura. Therefore bronchitis, pneumonia and pleurisy all may complicate influenza in severe cases.

Cough is a very troublesome symptom in severe cases of influenza. There may be no sputum in some but in epidemic forms of influenza generally sputum comes up and is bright pink or rosy and forthy. Large quantities are expectorated in some cases.

Cough in Pleurisy

The cough of pleurisy is dry, short and distressing. Cough is generally an early symptom. A sharp

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stitch-like pain in the chest which is always present in pleurisy is aggravated by coughing and deep inspiration

Cough in Tuberculosis

In pulmonary tuberculosis cough is a painful symptom. It varies in different types of tuberculosis. It may be sometimes dry, persistent and ineffective. In association with bronchitis the cough is usually accompanied by expectoration. In tuberculosis of the larynx the cough is husky and frequently painful. Early in the disease there is no sputum.

Whooping Cough

It is a disease of infancy and childhood, but it occasionally occurs in adult life. It is one of the most fatal and formidable diseases of early life. Most attacks occur between the ages of 1 and 10 years. Infants under the age of 12 months often succumb. After 10 years of age there is little fatality. The greatest number of cases however occur between one and two years of age. One attack gives an immunity to further attacks.

The characteristic whooping noise is preceded by ordinary bronchial catarrh and coryza with slight feverishness. It is then undistinguishable from ordinary cough of bronchitis. It is an epidemic infective disease and is characterised by a catarrhal condition of the air passages attended by a cough of

WHOOPING COUGH TREATMENT OF COUGHS

great violence and intensity The peculiar cough comes in paroxysms and consists of a series of rapid, short, explosive and expiratory efforts and then a long-drawn, loud, whooping inspiration This is repeated several times according to the severity of the paroxysm

It is highly contagious during the catarrhal stage and droplets of cough may infect those who may be near Isolation is of the utmost importance, particularly for the protection of other children. Treatment is antiseptic inhalation Expectorants like Vasaka, sedatives like potass bromide and chota chandra are good in appropriate doses Garlic has a great place as an antiseptic and antispasmodic In prolonged spasmodic attacks $\frac{1}{2}$ grain doses of dry datura leaves will be effective Inhalation as in other coughs and massaging of anodynes on the chest are useful If there is convulsion treat as indicated under convulsion

Treatment in Coughs

The treatment is common and has been described in details under pain in bronchitis and fever in bronchitis etc Fresh air should be provided for the patient The contrary custom of confining patients in respiratory diseases in closed rooms is positively injurious It delays recovery and brings in complications There is no fear of increasing the disease if fresh air blows through the room while the patient remains covered It can do only good

HOME TREATMENT OF SYMPTOMS

and is necessary. Water should be given in plenty to drink. The patient should be massaged and sponged once or oftener during the day. Counter irritants should be applied on the chest in the form of poultice or poultice mixed with anodynes in case of pain. Where there is much distress, sedatives may be given in the form of potass bromide or chota chandra in 10 grains doses. Inhalation of steam mixed with eucalyptus oil is to be given. Vasaka is the chief item of use as an expectorant. Expectorants are described fully under fever in bronchitis etc. Small doses of quinine are useful in acute cases. Garlic juice is of all round utility in all forms of cough.

FAINTING AND CONVULSION

Fainting, swooning or syncope is a temporary cessation of respiration and circulation and suspension of consciousness. The heart may beat on and respiration may be very slow and laboured. When on account of any cause there is not enough circulation of blood in the brain, consciousness is lost and there is fainting fit. High temperature as in fever, loss of blood, shock or fright, intense pain, irregularity of the monthly flow in women, all may cause fainting. Generally in fainting the unconscious person becomes pale, the pulse becomes feeble and there is a general death-like countenance. The extremities grow pale or blue. Blue colouration is due to non-oxidation of blood.

The patient should be placed in fresh air or outdoors and fanned. Cold should be applied on the head in a jet of water. Cold water should be splashed on the face in spray and hot water bottles under the feet. The head should be placed in a hanging down position so that blood may flow into it by gravity. If respiration ceases, artificial respiration should at once be started. When the patient is breathing, burnt feather may be put near the nose. The ammoniacal smell irritates and causes consciousness to return. In fainting of hysteria ammoniacal smell is particularly useful. When fainting is long continued, mustard plaster should be placed on the chest as counter irritant to stimulate the circulation.

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Convulsion

Injury to the brain from any sources whatever whether from violence from without or from disease within, may cause convulsions. These convulsions may have any names such as epilepsy, infantile convulsions, febrile convulsion, uræmic convulsions, convulsions of eclampsia, convulsion due to worms etc. Apart from internal and external injuries to the brain, toxic condition is largely responsible for convulsions.

It seems probable that convolution is due to error of metabolism which allows development of a poison having the effect of suddenly arresting cerebral nervous function. Poisons from without or those developed within the body as in infectious fevers or occurring in degraded metabolic conditions such as in rickets, renal disease, high blood pressure, liver disease or eclampsia produce manifestation of convulsions similar to those of epilepsy.

In epilepsy the patient generally gets warning that an attack is coming. In a well-developed case he is seized with loss of consciousness and loss of power. He falls on the ground. Convulsive movements of the body begin first at one limb and rapidly spread over the whole body. The spasm makes the neck so twisted that it appears as if the patient is trying to look over his back. The eyes are fixed and open without any response to light. The face is pale and the skin is cold and clammy. The hands are clenched. The teeth also become clenched and foam comes out of the mouth.

EPILEPSY

The convulsions may continue from a few moments to a few hours. The longer the convulsions last, the more exhausted the patient becomes. Afterwards the patient becomes motionless and remains insensible for sometimes. The swoon breaks, followed by deep sleep. In some cases the convulsions may continue without break or the convulsions follow so quickly one upon another that there is practically no break.

During the fits of attack when the patient is unconscious fresh air should be admitted freely. Cold water should be sprayed on the face, taking care that none goes inside the nose and obstructs breathing. The patient should be laid on back. Death due to asphyxia occurs if the nose is buried in pillow in a night attack or if the attack comes on when the patient is in water, as for bathing. Next to splashing cold water on the face, the whole body should be drenched with water. The neck and chest should particularly be drenched with water and should be laid bare. Care should be taken that there is no injury to the limbs on account of the convulsive shakings. Ice water enema is useful in bringing back consciousness. After the fit the patient should be allowed to sleep. He may be given a dose of potass bromide and warm milk as diet.

During the intervals between fits, the patient should live carefully although it has been found that no precautions can prevent epileptic fits in some cases. Potass bromide however may do a good deal if given in 30 to 60 grains doses per day during the

HOME TREATMENT OF SYMPTOMS

premonitory stage in cases where the patient gets a timely warning. It has been known to ward off attacks.

In sunstroke there is a premonitory feeling of approaching illness. It may last a few hours or days followed by an attack or it may pass off. The attack may come without any warning. It is due to nervous disturbance due to moist high temperature, with or without exposure to the sun. Liability to an attack is enhanced by fatigue, mental disturbance, sleeping in crowded rooms and by constipation.

The patient feels dull and is unable to have much exertion. There may be a sensation of giddiness. When anything like the above is noticed in persons exposed to high temperature, he should be removed to a cool place in shade and given to drink cold water in plenty. The body should be sponged with ice water or wet pack should be applied. An attack may be prevented in this manner.

In an attack the period of insensibility may be accompanied by hyperpyrexia, delirium and convulsions. The face is flushed, the eyes get bloodshot and breathing is stertorous or snoring. Treatment is the same as in the case of epilepsy.

In uræmia convulsions may occur. When convulsions or other cerebral symptoms occur in uræmia, the outlook becomes grave. Uræmia is a toxic condition brought about by the failure of the kidneys to perform their function. The kidneys eliminate

URÆMIA CHOLERA

urea and other poisons from the blood which are formed in the life process. The kidneys retain from the blood what is to be retained and eliminate what is necessary for elimination. Failure of the kidneys to function becomes therefore a serious matter. Inflammation of the kidneys and various other kidney diseases may bring about this condition. Renal failure means nonformation of urine. Blood then gets on being charged with toxins every moment. In cholera the kidneys are adversely affected and there is no formation of urine. If the blood pressure is raised and if the toxins produced by cholera bacilli are stopped, the kidneys may function and uræmia may be avoided. But there is a grave risk of uræmia in all severe attacks of cholera in which the patient passes through a state of collapse and where blood pressure is high and no urine is formed.

Usually in acute cases of uræmia the symptoms begin with severe headache, vomiting, restlessness, delirium and drowsiness and twitchings of the face and hands follow. Twitchings may become aggravated into convulsions as in epilepsy. The drowsiness deepens to coma and ends in death. Paralysis of one side or one limb may follow convulsions and there may be total blindness. Cases are known to have recovered even after appearance of convulsions but are rare. Cupping of the region over the kidneys, stimulation of the action of the skin and alternate wet and warm packs may help to eliminate toxins. For details see under cholera.

HOME TREATMENT OF SYMPTOMS

In measles the brain symptoms may appear and consequent convulsion. This is due to toxins created by the disease attacking the brain. Should convulsions appear, treatment would be along the general line of application of cold and administration of sedatives. The patient should be given cold sponging or wet pack according to gravity. The head should be kept under a jet of water from a douche-can. Potass bromide in 10 grains doses up to 60 grains for adults may be given. When the temperature is not high hot bath is valuable. For high temperature cold bath is to be given.

In whooping cough convulsions may appear in infants and young children. Prolonged spasm may induce choking fits. Other complications are loss of voice, coma and paralysis of one or all limbs. Repeated convulsions are of grave omen. Sedatives should be given. Potass bromide in 5 grains doses and datura leaf powder in $\frac{1}{2}$ grain doses for children are useful. Garlic is very useful. The juice is to be given in 5 minims doses, several times a day.

In ascariasis or infection by round worms gnashing of the teeth occurs and there may be convulsions due to toxæmia. The remedy lies in expelling the worms. Santonin is a stock remedy. Santonin 2 to 3 grains with calomel 2 grains for an adult may be given on alternate days with preliminary starvation followed by magnesium sulphate after the administration of the drug. For a child of 1 to 3

TREATMENT OF CONVULSIONS

years old, santonin 1 to 2 grains may be safely given followed by a morning purge

In pneumonia of children convulsions may occur. Treatment should lie in application of cold on the head, sponging and in giving potass bromide and garlic as in whooping cough

For treatment of convulsions bowels should be moved. Mild purgatives like castor oil should be given when the patient is conscious Every effort should be made to eliminate the toxins by purgation and taking large quantities of water and by frequent sponging of the skin Dry cupping may be applied for 15 minutes on the loins Letting off of blood by opening a vein is useful Blood may be diluted by intravenous injection of normal saline after withdrawal of a quantity of it by venesection Less saline should be introduced than the quantity of blood withdrawn in order to avoid rise of blood pressure

Infantile convulsions are common and brought about by various causes, the chief amongst these are acute infective fevers and gastro-intestinal disorders In a child the occurrence of convulsion does not depend upon the height of temperature Often a slight rise of temperature is followed by fainting or convulsions The predisposition of the child is the chief factor No temperature limit can therefore be laid below which there is no risk of convulsion

In severe and prolonged diseases of the digestive system enough toxins may be produced to bring

HOME TREATMENT OF SYMPTOMS

about fits of convulsion. Worms induce convulsions easily in children

Epilepsy occurs in any age from a few days onwards Convulsions when due to epilepsy, exhibit symptoms which have been described already under that heading

Treatment:—In high fever the child is immersed in a cold bath But if the fever is not high or if there is no fever as in a gastric trouble or worms or epilepsy the child is put in a tepid bath of 100° F or just at a temperature above the blood heat. He should be kept for 5 minutes in bath and should not be rubbed dry but quickly wrapped in towels. When the child can swallow, a dose of potass bromide is to be given If he is unconscious and cannot swallow, potass bromide in solution may be given by the rectum preceded by glycerine enema. The bowels should be washed out with normal saline solution

Dose of Potass Bromide

Age	By mouth	Rectum
A few days	grains 1	2
Six months	, 2	4
One year	, 4	8

If necessary the dose may be repeated after an hour or it can be administered every three hours Older children should have proportionately higher doses.

ECLAMPSIA

Convulsions in Pregnancy or Eclampsia

Eclampsia is a disease of pregnant women, mostly of those who are pregnant for the first time. The disease sets in generally between the eighth and tenth months. It is due to the absorption of toxins by the system. The first signs are swelling of the legs and feet, epigastric pain, scanty and coloured urine, albumin in urine, headache, giddiness, sleeplessness or drowsiness, loss of vision, flashes of light before the eyes, and difficulty of breathing during movement. Any or all of these signs may appear. When they do appear, it is a serious matter. The convulsions may come before, during and after delivery. These are always serious and mortality is great.

Treatment should be begun by attempts to eliminate the toxins. Milk diet, drinking plenty of water, stimulation of the action of the skin by massage, sun bath and cold bath and cleansing of bowels by saline purgatives are the general methods. If there is headache or giddiness or sleeplessness, potass bromide or chota chandra should be given.

These measures may ward off fits. Should fits and convulsions appear treatment should be on the general lines indicated for convulsion. In serious cases it may be necessary to empty the uterus by inducing delivery under the advice and care of a specialist.

JAUNDICE

Jaundice is caused by the presence of bile pigment in the blood. There is some little bile pigment in the blood normally. But there is a limit. When that limit or saturation point is exceeded, bile is thrown out in the urine from the blood and anything in excess gets deposited at various places such as the conjunctivæ, the skin of the face, under surface of the tongue and lips and the limbs in the system causing yellow coloration. Jaundice is the effect of excess of this bile substance in blood. Bile pigment originates from blood and blood corpuscles may be destroyed by various causes throwing the bile pigment in blood or the bile pigments formed in the liver may have its passage to the small intestine choked so that these stagnate in the liver and ultimately find their way into the blood.

Certain conditions create toxin in blood having such a character that by their reaction the liver cells are injured. Damage to the liver cells is fraught with disastrous results. Bile pigment material made out of blood in the bone marrow and in the spleen, must need be transformed into bile and get mixed with food in its passage into the intestines. It is this bile that keeps the intestines free from injurious bacterial action. If bile is withheld from the food, fæces get white. Fat and proteins specially require bile for their

CAUSES OF JAUNDICE

digestion In the absence of bile, fat or oils form a sort of soap and pass out with stools as bits of soap or simply as unaltered fat The colour of faeces becomes pale or white It becomes forthy, gaseous and foul-smelling While these troubles are brought about by the absence of bile from the intestines, positive mischief is done by the accumulated bile pigment finding access to the portal circulation The bile material must go somewhere If it cannot come to the intestines, the liver then shoves it on to general circulation Here these pigment materials alter the character of blood and work out immense mischief

All these are due to different causes Firstly, changes in the blood itself may cause excessive quantities of blood and blood corpuscles to be broken down making overproduction of bile Secondly, it is due to the failure of the liver to function Injured cells of the liver cannot deal with the material handed over to it for making bile and in its incapacity, it shoves the material to blood stream Thirdly, mischief is brought about if the liver be in working order and blood be normal but the bile duct be obstructed by inflammation or gall stones or a round worm foolishly travelling up to the duct and causing an obstruction there

All these disturbances have different medical names. The result of these disturbances is however common We call the common result, jaundice Jaundice is a symptom of bile in disease rather than a disease by itself

HOME TREATMENT OF SYMPTOMS

The effect of excess of bile in blood is felt the earliest in the urine, which gets changed in colour. Then the conjunctivæ get coloured then the hands and feet and then the whole body. In some cases where the liver is toxically affected marvellous changes occur even in one night. The whole body may become deep yellow in a few days. The pigment is penetrable through the skin. If a patient suffering severely from jaundice is rubbed with a wet white napkin, the napkin gets yellow.

The liver cells may break down on account of malaria and kala-azar. Should such a thing happen, should a malaria or kala-azar patient get jaundice, the prognosis is bad indeed. It will indicate that the liver has gone seriously wrong. If the liver goes very wrong, the whole system goes wrong.

New-born infants often get jaundice 2 or 3 days after birth. But this jaundice passes off quickly without any treatment.

When the cause of jaundice lies in the wreck of the liver cells, it must be regarded as a grave thing and almost an irremediable thing. If the cell destruction has not gone far, then by treatment what remains of the liver may be gently dealt with to function, taking care not to tax it. When jaundice is due to toxic condition or to pressure on the organs or due to choking of the duct by gall stones, inflammation or round worms, the root cause has to be removed.

TREATMENT OF JAUNDICE

Treatment —Generally speaking we have to pay much attention to the improvement of the general health for correction of jaundice. The skin should be made to function. In severe cases the pigments may be got rid of to an extent by making the patient sit in a water tub and then rubbing the skin with water. Water gets yellow. Bowels should be kept moved. For this purpose magnesium sulphate is the best. In repeated small doses of one or two drams it not only acts as an aperient but also induces the flow of bile and thereby removes congestion of the liver. Calomel in $\frac{1}{2}$ grain doses with soda bicarb acts magically in early stages in some cases. Care should be taken to watch for stomatitis or salivation indicating mercurial poisoning. Magnesium sulphate and calomel may be given alternately. Sometimes the liver is affected by amoebæ which may not cause dysentery yet cause the liver trouble. Emetine hydrochlor $\frac{1}{2}$ —1 grain injected intramuscularly twice a week acts beneficially. Kurchi should be given here regularly. Where the heart is weak and the kidneys cannot function properly, the heart should be strengthened by administration of powdered arjun bark in 30 grains doses.

Green leaves of arahar, a leguminous plant the beans of which are used for dals, or any edible green leaves should be pressed and the juice taken about 2 ounces daily. Marked improvement is seen to follow its use. The vitamin of the leaves may have something to do with efficacy.

HOME TREATMENT OF SYMPTOMS

Exposure particularly to the sun remarkably increases yellowness of the eyes. All exhausting work should be avoided. Diet should be very light and consistent with the digestive capacity of the patient. Milk from which butter is taken out may be made into dahi. This will make an excellent diet. Dals should be avoided.

Eruptions, Scabs and Parasites on Skin

Eruptions may be accompanied by fevers, such fevers are called eruptive fevers. Eruptions and scabs may be confined to the skin only and then they are classed as skin diseases.

Eruptive fevers such as small pox, chicken pox, dengue and measles and syphilis have already been dealt with. The skin diseases call for attention. These have been described under skin diseases in chapter XVII.

Inflammation of Various Organs

Inflammation of the nose, eye and ear have some common characters although their origin may be different. Inflammations generally require soothing application. On the skin if there is swelling or an eruption soda bicarb in solution is useful. In swellings or erysipelas or sprain cold compress of magnesium sulphate in saturated solution does great good. In erysipelas iodine solution should be

INFLAMMATION OF EYES, NOSE AND EARS

injected locally along the boundary of the swelling. Toxic condition should be relieved by aperients

In inflammation of the eyes zinc sulphate solution 2 grains to an ounce of water or boric acid 8 grains to an ounce or a mixture of the two is an all round good lotion Zinc sulphate causes a little biting sensation but has good soothing effect The inflammation may take the form of conjunctivitis In children there is often found a constant flow of water from the corners of the eyes If it is due to irritation, application of some boric lotion will do good But more often this shedding of water from the eye corner is an indication of vitamin A deficiency. In such cases the quantity of milk should be increased, butter and cream may be added to diet and juice of betel leaves is of use All these and other substances containing vitamin A and suitable to the patient should be tried

When a foreign body gets into the eye or the eye is irritated by dust or blasts of air or cold, castor oil dropped into the eye is a soother Castor oil should not be rancid. Rancid oil irritates the eyes

When the nose begins to give trouble by flow of water or thicker stuff, the remedy lies in sucking in an antiseptic lotion like borax, thymol and soda bicarb in water or simply thymol dissolved in water in proportion of $\frac{1}{2}$ grain to an ounce When the inflammation is dry, a borax honey paint is useful

In inflammation of the ear we have to depend on heat application and application of anodynes inside

External heat may be applied by heating small pads of cotton over a fire or over a lantern. An anodyne for the ear may be made by mixing 4 grains of opium with a little water or oil and warming it to the body temperature and then dropping it into the ear. Garlic juice dropped into the ear relieve earache.

In inflammation of the ear and the glands, application of dry heat is of great service. Dry heat may be applied by placing some salt or sand in a piece of rag and making a loose bundle of it. The bundle is heated by putting it over a lighted lantern, when hot it is applied on the affected part. If two of these are made by changing them the place can be kept hot continuously.

In gonorrhœa there may be inflammation of the urinary canal in males and in females it may extend to the neck of the uterus. It is the result of action of gonococci which find their entrance through sexual contact. This one disease may lead to many serious and chronic diseases. Sometimes pus forms which is discharged with urine. It is a very painful disease. Passing of urine causes great pain. This is due to the acid nature of the urine. Distress may be alleviated by making the urine alkaline by taking large doses of soda bicarb.

When there is pus, the passage should be douched with a very faintly blue solution of copper sulphate. Demulcent fluids should be drunk such as isafgul or bael sherbat. Santal oil by the mouth soothes pain

SWELLING, DROPSY OR OEDEMA

Dropsy is accumulation of water showing a swelling in one or several parts of the body. The eyelids and face, legs and hands and the belly and the whole body swell in dropsy. Dropsy is due to the extraction of serum from the blood and its deposition in muscular tissues and cavities of the body. Very often the causes are interference with the circulation and lowered blood pressure. The most usual positions of dropsy are the lower extremities and the abdomen. Dropsy is recognised by pitting on pressure on the shin of the tibia.

In diseases of the kidneys dropsy generally begins in the eyelids and private parts, the feet and legs are then quickly affected.

In diseases of the liver and the spleen, the abdomen is affected first. It swells and is felt to contain fluid. This state is called ascites. Ascites indicates a very low vitality. In chronic diseases of whatever origin, as in kala-azar or malaria or dysentery dropsy indicates a far reaching injury to the system by the disease. Dropsy may be due to the general break down of health and anaemia due to hook worm infection.

In diseases of the heart specially disease of the mitral valves, dropsy predominates in the dependent parts such as legs and the back with dyspnoea and palpitation.

HOME TREATMENT OF SYMPTOMS

Menstrual disturbances and the period of cessation of menses may be marked with dropsy. In pregnancy also in the third or fourth month dropsy may occur but these need not cause serious anxiety.

Epidemic dropsy or beri-beri causes swelling on legs first and spreads to the whole body. In chronic diseases such as diarrhoea, dysentery, T. B. etc the feet swell at the last stage.

In all these cases the treatment is the same. The cause has to be removed. Where the cause is in the faulty liver or spleen or kidneys or the heart, these organs should be strengthened. But the general treatment consists in eliminating fluid by purgation, evacuations and through the skin. The patient should be given magnesium sulphate in repeated doses. It is a hydragogue purgative and draws forth and throws off accumulated serum. Bowels should be kept clean by daily wash with douche. This is intended to remove toxins and thereby improve the general health. Elimination through the skin is to be brought about by sponging or bathing in cold or tepid water according to the condition of the patient. Cold water is beneficial whenever it is tolerated. Warm bath tends to weaken the heart. Free urination should be induced by the administration of punarnava juice of green leaves or dry powder of leaves and stalks (30 grains) may be given. Potass nitrate or *Shora* may be given with the same object in 10 grains doses. For internal asepsis and flow of bile calomel in $\frac{1}{4}$ grain doses with 15 or 20 grains of soda bicarb is invaluable.

URTICARIA LEPROSY GOITRE

Many beri-beri patients have been cured by treating with (1) punarnava, (2) arjun, (3) calomel with soda bicarb with occasional 1 dram doses of magnesium sulphate 3 or 4 times daily. This may be taken as a general efficient formula for most cases of dropsy. In dropsy attention should be given for improvement of general health. The use of massage and sun's rays in healing should be given its proper place in the treatment of dropsy as in all other diseases. Vitamin deficiency should be corrected by choosing a suitable diet.

Eruptions

Eruptions have been largely dealt with in the cases of eruptive fevers such as measles, chicken pox, small pox etc. There are other eruptions on the skin due to various causes. Urticaria creates lumpy eruptions suddenly and may be cured by attending to diet and proper evacuation by a dose of magnesium sulphate. Leprosy sets up also eruptions at one period. Leprosy has been dealt with in another chapter.

Goitre

Swellings other than that of dropsy occur in various diseases. Goitre is an instance. Iodine deficiency causes the thyroid gland to swell. There are some areas where cases of goitre are numerous. The disease follows certain river courses and is

HOME TREATMENT OF SYMPTOMS

ascribed to water. The remedy lies in painting the swelling with tincture of iodine and taking a few drop-doses of tincture iodine daily with water.

Ulceration

Ulceration removes the outer surface of the skin and the wound does not allow the surface to function. Ulceration of the mouth or stomatitis requires attention to be given to the root cause. But local relief may be obtained by a gargle of dilute alum. Concentrated solution of alum may be applied with the help of a swab on the ulcerated spot.

Ulceration in the intestines—see dysentery where doses of alum may also be useful.

On ulcerated surface a paint of astringent like alum or myrobalan decoction is very useful.

Bleeding

For internal and external bleeding astringents are useful. Alum and myrobalan decoction are such astringents. Calcium lactate 10 to 15 grains doses checks internal bleeding effectively. The subject is fully dealt with in Accidents. For bleeding in pregnancy see chapter VII.

CHAPTER—VII

PREGNANCY . CARE OF MOTHER AND CHILD

Preface

Pregnancy requires attention from every lover of humanity. The natural processes of the growth of the foetus and delivery of the child are to be followed by adequate precautions about the health of the mother. The mechanism of labour or delivery requires attention for proper handling of the expectant mother. Knowledge on these matters may minimise probably deaths both of the mother and the child.

Having no personal knowledge, the author requested an experienced gynaecologist to write this chapter. He was unable to write but promised to give me lessons and direct me in writing. The pages of the book commencing with conception and ending in the management of delivery have been written under his able direction. He prefers to remain unnamed but readers will here find the experiences of an expert who has spent his life in this profession.

There are many things indicated here which will help the village doctor to guide the *dhais* or village midwives for taking proper care of the mother at a very critical time of her life. Some *dhais* have good experiences and with aid and warning much improvement over the present state of affairs in the villages may be brought about.

Introductory

The subject of pregnancy and care of the mother and child is of great importance. The future generation lies in the womb of the mother as the present generation lay. It has to be admitted that if the race is to be conserved and improved, care should be taken from the very beginning of life in the mother's womb. Theoretically all this is accepted and acknowledged but practically we as a nation have been showing at present woeful neglect as compared with other progressive nations. Ignorance, neglect and lack of will to carry into practice the ordinary laws of sanitation, are found in most families. The result is that there is an enormous loss of foetal life and also there is appalling infant mortality and high maternal mortality as well.

In India taken as a whole, 50 per thousand get still-born and 200 per thousand are cases of abortion, while 300 children out of every thousand born, die as infants in the first year of life, making up the total mortality 550 per thousand of all pregnancies. In England infant mortality is only 60 per thousand against 300 in India. This does not take account of the lives of mothers, a very large number of whom die a premature and unnatural death while a vast number remain lifelong invalids.

In other countries, the death rate has been brought down by better asepsis and by better care of the

INTRODUCTORY

mother prior to and after delivery In the following pages attempts will be made to impart such elementary knowledge on the subject which will go somewhat towards decreasing death rate and towards conserving the health of the mother and child

We shall be dealing with asepsis first as this is the most important matter Too much emphasis cannot be laid on the fact that about ninetyfive per cent of cases of labour are normal and require no interference whatever, and that asepsis in these cases is reduced to knowing what not to do, so that we may ensure uninterrupted asepsis by nature

Many false notions about care of pregnant women should go and newer knowledge and traditions have to be built up to prevent the present wanton loss of life and health What usually happens in case of pregnancy is that prior to delivery, the expectant mother is cared for in an orthodox way according to the traditions of the family These traditions when based on scientific knowledge are great help but often we find that the traditions are against scientific knowledge Such traditions have to go and newer ones substituted in their place During delivery the universal custom is to place everything in the hands of untrained *dhais* who have no knowledge of asepsis and who are generally too conservative in their crude and dirty ways to listen to the requirements of asepsis

Experienced women in house can certainly be expected to better attend a delivery case than

ignorant and unclean dhais. An attendant may be called in to assist but she cannot be given the charge of the case. The principal part should be taken by some intelligent member of the family equipped with such knowledge as is attempted to be given here

The village doctor has to play an important role. He has to learn for himself and educate responsible persons in the families under his care what to do and what not to do in pregnancy and labour. He has further to know for himself when the case becomes abnormal and requires the aid of an expert. Much material is given herein by which a village doctor may, by external examination, diagnose abnormal cases but when he thinks that an internal examination is necessary, he should send for an expert or an experienced doctor. If such help is not available, he should refrain from interfering and leave the case to nature. He will be helping the patient most by doing so. The following pages, we hope, will help towards the fulfilment of this object

ASEPSIS IN MIDWIFERY

Nature has provided ample means of protection against sepsis before, during and after delivery. Animals demonstrate the extent to which the natural protective forces and agencies operate in preventing sepsis. Domestic animals on observation will be found to be quite free from sepsis after delivery although they continue their usual ways of living. The delivery takes place naturally and without any aid, the private parts of the mother animal remain aseptic. Nature is no less merciful to the human mother. The natural conditions are such that sepsis is automatically prevented. We shall try to understand the mechanism by which nature ensures asepsis during labour and afterwards.

Normally the vaginal canal remains acid with secretions of lactic acid bacilli. These bacilli serve as the outer defence to the uterus. They disfavour the growth of other injurious bacilli. After conception however, their number greatly increases. The canal then becomes a strong defence against the approach of injurious bacilli towards the uterus, which they guard.

The neck of the uterus or the cervix remains normally constricted and closed but for a pinhole. This opening lets out menstrual discharges from

the uterus in the downward direction and permits male sperms to travel up after coitus. When the sperm travelling up meets an ovum and successfully combines with it, the fertilised ovum gets impregnated and then drops into the uterus and gets lodged on its surface. Thereupon it becomes one of the greatest concerns of nature to prevent the introduction of any bacteria from outside into the uterus. On impregnation the cervix gets softened and a jelly-like ball of mucus closes the opening of the uterus.

This ball of mucus is called the operculum. It consists largely of phagocytes, those white corpuscles of blood which have the function of absorbing within themselves enemy bacteria and destroying them. The nature of phagocytes has been described in details in chapter 1. If after the death of a pregnant woman the operculum be examined it will be found that the portion of it (1) which closes the approach from the vaginal canal may contain some bacteria. The layer next to it (2) is full of phagocytes only, while the uppermost portion (3) is absolutely sterile or free from any sort of germs.

The operculum is a plug. It shuts all ingress and egress from the uterus. So long as there was no conception, the cervix had to be kept open but as soon as there has been impregnation, the opening has to be shut down. There is no further necessity of the menstrual flow to pass or the sperm to travel up. The fertilised ovum grows up into a foetus and then is delivered out as a fully developed child without any

ASEPSIS IN MIDWIFERY

interference from outside and protected from all bacterial attacks It is in this way that nature ensures asepsis within the uterus prior to labour

During labour also nature provides for the most wonderful contrivance for securing asepsis No punctiliously careful surgeon could have designed anything approaching the perfection of natural asepsis of the uterus and vaginal canal So long it was nature's care to protect the uterus only but now during labour nature has to make manifold preparations The child is to be delivered in aseptic condition and after delivery not only the uterus but also the vaginal canal have got to be kept aseptic After delivery the cervix does not close down at once It remains dilated or open to approach from outside for a considerable time Nature has devised means for keeping the canal and interior aseptic during this term in a manner which can in no way be improved upon

What happens during labour is this The head of the child approaches the cervix and there is the layer of liquor amnii as a pad over the head Labour pain causes the mother to force down the head When the downward pressure reaches a certain stage the membrane enclosing liquor amnii bursts Then there is a torrential flow of water which carries off before it the operculum and cleans off the walls of the vaginal canal So long the operculum was guarding the cervix and the acid nature of the lactic acid bacilli was guarding the vaginal canal The operculum has to go to give passage to the child coming

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out. But what about the lactic acid bacilli—those defenders of the outer approach? No, these erstwhile defenders also must go. Nothing is allowed to remain on the vaginal wall. The purpose of defence has been accomplished and no one is allowed to remain in the passage on any plea. The gush of water washes away everything before it.

Nature has provided hair on the head of the child. It has to serve a very useful purpose now. It is to act as a brush of hair for cleaning the passage of the vaginal canal. The canal has been washed by flushing but now when the head passes through the vaginal canal, all its folds distend, it becomes like a smooth distended pipe. The hair on the head of the child comes in tight contact with the surface of the wall. The head was aseptic so long as it was in the uterus and now this aseptic brush scrubs the walls of the vagina and takes off on itself any bacilli which could have escaped the previous flushing.

The head is delivered, the passage is cleaned free of all bacteria in two stages first by flushing and then by tight frictional scrubbing. Following up the head there is a reserve of back-water of liquor amnii, only a fraction of which was let out with the first onrush. Now the bulk of it follows the scrubbing head and very thoroughly washes off the canal clean along with the travel of the child down its course. Liquor amnii as we have shown, is a sterile fluid. But this is not enough. The placenta has yet to come and nature has reserved for it the final or the fourth act of

ASEPSIS IN MIDWIFERY

rendering the vaginal canal clean. After the child is delivered the placenta follows. It is a soft yielding material. When it passes down the vaginal canal, it not only works forward but twists and rotates. This gives the final wiping to the canal. When the placenta is thrown off, the vaginal canal has a flushed, scrubbed, watered and wiped surface in a thoroughly clean germ-free condition.

The process does not stop here. So long as the cervix remains dilated there is a flow of blood. This downward stream continues to keep the interior aseptic even after delivery.

We can break down these defensive mechanisms of nature but cannot improve upon it in normal labour. About ninety-five per cent of delivery cases are normal where there should be no interference. We shall indicate what the remainder abnormal cases may be and how to deal with them. But in all normal labour cases there should be no internal examination during labour, no interference with the vaginal canal by way of examination nor any need of aseptic precaution. Where the utmost aseptic condition is far beyond the skill of man to accomplish, any attempts to further asepsis such as by douching are to invite danger and undo and break down the marvellous and masterly defence mechanism provided by nature. Any internal examination in normal labour is attended with danger. In normal labour none should attempt internal examination or attempt to measure the opening of the cervix and ascertain

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that dilatation has gone so far from time to time The introduction of fingers within the vagina means deadly interference Your fingers and hand may be sterile although they cannot be perfectly so. But what about contamination from the vulva ? It may contain bacilli and the fingers as they pass in contact with the vulva may carry some bacteria into the interior The operculum may be pushed away by the fingers and thereby expose the interior of the uterus to bacterial attack. This examination of the interior in normal cases is not only unnecessary but is positively dangerous and is therefore reprehensible

Before delivery the vaginal canal in normal cases remains clean and any use of douche is unnecessary. Instead of helping, douching may serve to contaminate But even if the canal is douched before delivery, the matter is not so serious as douching for washing the vaginal canal after delivery As has been already explained, during delivery the canal has been made very thoroughly aseptic and all defences have been withdrawn. If at this stage, a douche nozzle is introduced into the canal it may by chance get contaminated. One may take precaution to sterilize the fluid and the douche nozzle but during introduction the nozzle may get contaminated. One must realise the seriousness of douching after delivery. The canal is already aseptic To try to render it further aseptic and in the attempt take the risk of contaminating the canal has no defence

ASEPSIS IN MIDWIFERY

Before delivery interference with nature may be necessary when nature fails. There may be purulent discharges from the vagina requiring antepartum douching. Instrumental aid may have to be taken and then a washing out of the canal may be necessary. In delayed labour blood and liquor amnii may accumulate. Although liquor amnii is originally sterile, yet by stagnating in the wall it may decompose and become fit ground for bacterial growth. The same may be said about blood. Outflow of blood will keep the canal aseptic but if blood stagnates, it is likely to decompose and become offensive.

After delivery abnormal condition is indicated if a dead child is given birth to, or if fetid matter is discharged after delivery. Again when instruments or hands have been used for helping delivery the canal is likely to be contaminated and in these cases aseptic douching becomes necessary.

It is worthwhile to repeat that in normal cases of delivery there is no chance of sepsis. Should there be sepsis in cases of normal delivery, it will indicate that there have been negligence and interference.

CONCEPTION AND GROWTH OF THE FŒTUS

Small globules called ova form in the ovaries and are carried forward into the fallopian tubes leading to the uterus. These are the female reproductive cells.

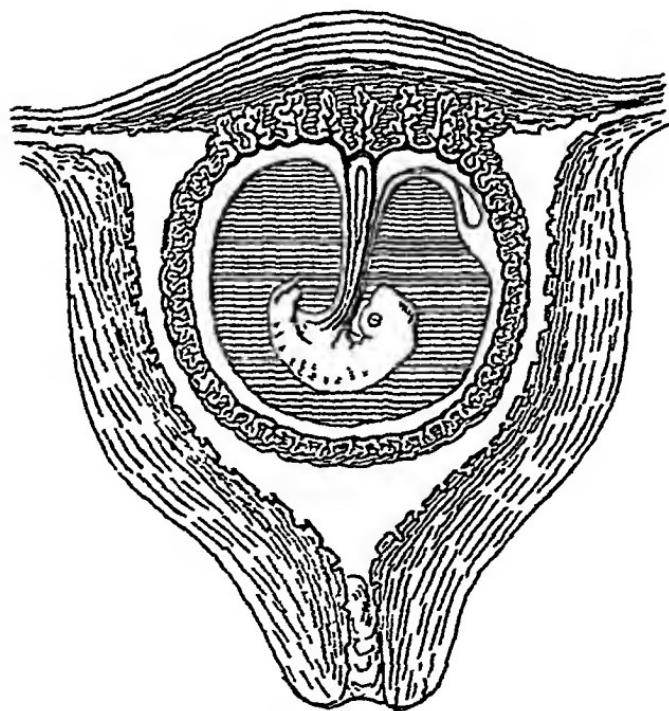


Fig. 129.
The uterus with an embryo.

They wait there in the tubes for fertilisation. After sexual contact with a male, the male reproductive cells or spermatozoa creep about in search of any stray ovum and when by chance a spermatozoon meets an

CONCEPTION GROWTH OF THE FÖTUS

ovum, a combination takes place. The combined product or the fertilised ovum travels down and enters the uterus and lodges there against the wall of the uterus. Here is the beginning of human life. The fertilised ovum is a mere tiny dot much smaller than a rye seed. It is $1/125$ th part of an inch in diameter.

Once within the uterus, the fertilised ovum begins to suck nutrition from the mother and grows. The

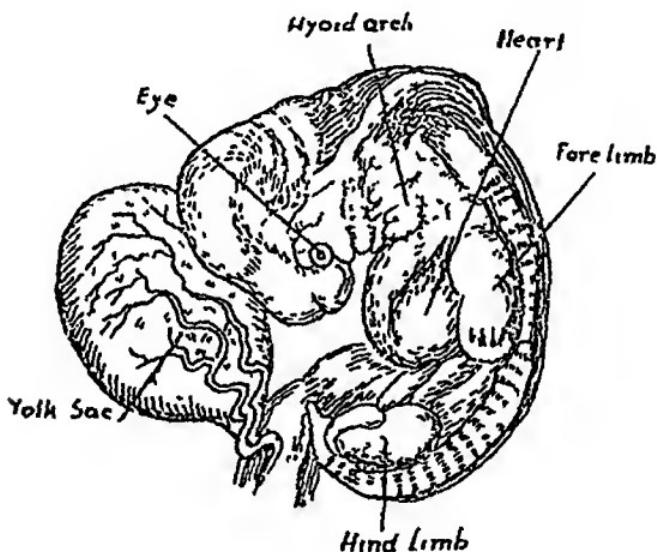


Fig 180
Human embryo 4 weeks old

embryo within the uterus gets a mass of blood vessels attached to itself from the uterus. Mother's blood gets into these blood vessels and builds the child's body.

In the beginning the fœtus is a shapeless jelly-like mass. At the end of the first month it grows as big as a pigeon's egg.

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In the second month it becomes about an inch long. There is just a trace of the formation of the head and the trunk of the shapeless mass. The foetus looks like a hen's egg at this stage.

In the third month the foetus shows a big head. The fingers begin to form and the trunk gets developed. It looks bigger than an orange at this time. The umbilical cord can be discerned and is attached to the placenta or the flat spongy body

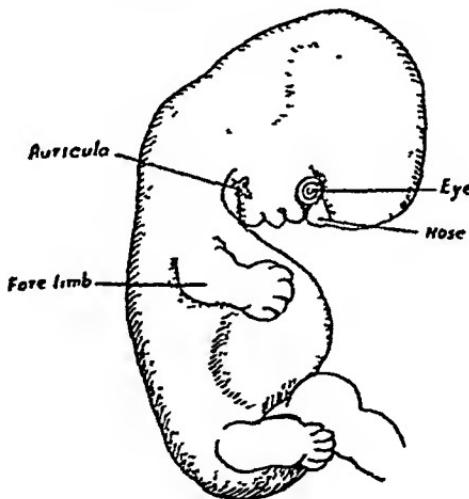


Fig. 181.
Human embryo 6 weeks old.

of blood vessels which feeds the child with nutrition from the mother's blood.

In the fourth month it gets well elongated being 5 to 6 inches long. Sex can be distinguished now.

In the fifth month the length is 9 to 10 inches. Hair and nails begin to grow. Bile begins to secrete from the liver and the intestines get formed and contain traces of stool or meconium

GROWTH OF FÆTUS DURATION OF PREGNANCY

In the sixth month the length is 12 to 13 inches. The bones of the head begin to develop. The fundus or the end of uterus now rises in a level with the navel of the mother.

In the seventh month fat shows below the well-formed skin.

In the eighth month the length is 15 to 16 inches. The child if born now may live on, if proper care is taken



Fig 182
Human embryo 8½ weeks old

The fœtus henceforth develops as a fully formed child and at the ninth month and after it is ready for coming out of the uterus. It weighs now six to eight pounds and is about 20 inches long.

Duration of Pregnancy

The duration of pregnancy is 280 days or nine months and ten days. The time is to be calculated

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from the date of the last menstruation. For easy calculation the same date next year less three months is to be taken to which 10 days are to be added. Thus if pregnancy occurs on the fifth of January then the date of child birth will come three months shorter of January or in October and the date will be five plus ten or fifteenth. Delivery may take place within two weeks earlier or later than the calculated date.

Where the date of last menstruation is not remembered then the week of observance of quickening by the mother may be taken as the 18th to 20th week of pregnancy and from it the date of delivery may be calculated on the basis of menstrual periods.

ANTENATAL CARE

Expectant mothers and those responsible for their care should know what to do and what to avoid during pregnancy. Pregnancy is a normal family affair and people take it as such. People are guided by traditions, some of which are good and some of which we know to be positively harmful. The harmful traditions and practices should be removed and substituted by better ones. But it is difficult to disseminate knowledge about care of mothers during pregnancy like that of asepsis during and after labour. In order to do this, not only the older knowledge but perhaps the older agencies have to be replaced. The untrained dhais, who are called in during labour mismanage and bring in sepsis on account of lack of knowledge. They have to change their methods or have to go. But about care of the mother no outside help is sought. Except in cases of difficulty, those who take care of the expectant mother in the family will resent any interest taken by outsiders. Under the circumstances it is one of the most difficult tasks to popularise knowledge about care of mothers and pregnancy in general so as to introduce better conditions.

An experienced doctor will be approached only in case of emergency and naturally so. A doctor is called

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in to cure disease and pregnancy is no disease that a doctor should be consulted about it. No necessity is felt about improving the existing practice for care of pregnant women, so that those who know might advise. Uncalled for advice fails of its purpose. The urge should come from within the family and at present, there is not only no urge, but a reverse of it. There is reticence about the condition of expectant mothers.

There is one way of approaching the subject. Women workers working without fees may take charge of a group of villages for welfare work amongst the masses regarding cases of pregnancy, from early stages to the first year of child's life. Such women workers if paid would receive their salaries from benevolent persons or corporate bodies or from the village doctor who had taken charge of the village.

A male village worker may like to help the villagers directly in this important matter, but it may not be possible for him to do so except through the medium of women workers.

There may be a school for teaching the professional dhais. The dhais would not care to attend such schools even if no fees be charged. To induce them to come and attend the lectures, a fee may be given for every course. She may get something every time she attends as a compensation for having been called away from her household work and a sum promised if the course is completed without break and if she becomes proficient in the subject. Along

ANTENATAL CARE

with this, the woman worker in charge of welfare work should get in touch with families having cases of pregnancy. The dhai who attends the classes should be remunerated each time she brings in information of cases of pregnancy, the fee being greater, the earlier the case. Once such information is obtained, contact will be established with families having cases of pregnancy. It is for the woman worker to utilise this contact. She may, by her urge for welfare work, make those persons listen to her, who should know. She may impart the same knowledge as she imparts to dhais, being all about pregnancy, asepsis and care of the mother before and after child birth. Thus a nucleus of training in the subject may begin and by its spread the existing conditions may be changed for the better.

We shall imagine our reader to be a student, striving for guidance as to what is to be done for cases for pregnancy. He may learn a little by reading these pages and in the light of his own experience train up male or female workers.

On getting reports of a case of pregnancy, it should be the endeavour of the worker to satisfy himself that it is really a case of pregnancy by studying the symptoms given later on. A pregnant woman and those interested in her should know what is good for her on the following points —

- 1 Dress, 2 Diet, 3. Exercise, 4 Skin, 5 Bowels,
- 6 Kidneys, 7 Breasts, 8 Journeys, 9 Amusements,

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10. Mental and nervous condition, 11. Sexual intercourse and 12. Symptoms of abnormalities.

Dress :—Garments should be free from offensive odour and should be daily washed and sunned. Tight garments should not be worn at all during pregnancy. Garments should be such as are generally considered sanitary. They should be of loose texture, have ample porosity and as far as possible of white colour to let the sun's rays or diffused light act on the skin.

Diet :—The expectant mother should have nourishing food. It is not enough that a little better food than usual is given to her. The foetus takes its due share of nutriment from the mother and goes on rapidly building itself at the cost of the mother. The foetus has no consideration regarding the capacity of the mother. Whether the mother has any blood to spare for it or not, the foetus will have its share. The result is often a drain on the resources of the underfed mother. The expectant mother must be fed very liberally as indicated below for herself for she needs all the nutrition and also some amount reserved for the great trial coming ahead, besides she has to build the body of the child. The food must be substantial, sufficient in quantity and quality and rich in all the commonly known vitamins. Protein foods such as meat, fish and eggs should better be avoided. The less of them the better. Milk and milk products should be increased. Fruits and leafy vegetables should be freely partaken of. Mung dal and other

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beans which have begun to sprout are rich in vitamins and should be taken raw

It is advisable to reduce the quantity of rice and take as much vegetable as the digestive system will permit without being upset Reduction in rice may be well made up by fruits, nuts and vegetables such as cucumbers, cocoanut green or ripe, bael, brinjals, lady's-fingers etc The choice should be for those items that are exposed to sun and reject tubers and roots These are rich in chlorophyl and act beneficially on the system and minimise the chances of constipation

Exercise —Some amount of exercise is absolutely necessary during the period of pregnancy in order to give health to the child in womb and also to effect a normal healthy delivery for the mother with the least amount of pain, exertion and disturbances Exercise puts blood into circulation which helps the scavenging away of impurities Exercise also increases capacity to assimilate Those who idle away and do not exercise or move about during pregnancy, store trouble for the future The expulsive spasm of pain of delivery does not come with sufficient force to the idle and the nervous woman and she suffers from continuous slow pain endangering her own life and that of the child Exercise should be moderate so that there may be no feeling of exhaustion Ordinary household occupation provides ample exercise if carefully chosen Paddy husking, washing of clothes by beating etc are

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harmful being of the nature of severe and exhausting exercises.

Skin :—Skin should be attended to. The skin is an excretory organ and its care has been mentioned in chapter II. Particular care should be taken during pregnancy to see that this important excretory at the same time light-absorbing organ is allowed to work normally.

Bath should follow a massage with oil and two or three baths may be taken daily according to temperament and capacity of the system to take them.

Bowels :—The bowels should be kept very freely moved. Constipation at any time is bad and during pregnancy is particularly so. For constipation plenty of vegetables should be taken and if necessary myrobalan may be taken every night before going to bed. This does not create a drug habit but is useful to the system in various other ways.

Plenty of water should be taken during pregnancy. Toxins are being continually formed. Previously it was from the body of one person but now the foetus also manufactures toxins and these have to be got rid of. Plenty of water therefore is an absolute necessity. No narcotics should be taken and the habit of drinking tea should be given up. Narcotics interfere with the free motion of bowels besides doing a lot of other mischief. Fruits like bael, papaya etc. should be taken to avoid constipation.

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Kidneys —Urine should not be retained On account of the growth of the child, the space for the bladder gets narrowed down and it may not store its normal contents of urine without strain More frequent micturition may be a necessity. The kidneys should be relieved as often as there is a call Plenty of water should be taken to ensure free elimination of toxins through the kidneys If the quantity of urine is lessened, steps should be taken to know the cause and correct it

Breasts —The nipples should be kept clean by rubbing with a rough towel otherwise dirt may accumulate and cause a lot of trouble The nipples should be well developed and protruding so that the child may feel ease in sucking Short nipple of the nature of a stump is inconvenient for the child to suck from A child may get a feeling of suffocation if the opening of the nostrils comes in contact with the breasts The breasts should be massaged and lubricated They should be softened by emollient applications before onset of labour, in case they are hard

Journey —This should not be undertaken Some jerks are unavoidable in journeys and these are bad particularly during the earlier and later months of pregnancy The first three months are full of pitfalls and journeys should be avoided If there is a history of previous abortion and miscarriage, it is better not to have any journey during pregnancy If journeys must be undertaken, then during the comparatively

PREGNANCY : CARE OF MOTHER AND CHILD

safer fifth, sixth and seventh months should be chosen provided the health of the mother is good and there is no unfavourable previous history and where a smooth journey without joltings may be ensured. During the last three months there should better be no journeys

Amusements — Habit should be regulated with regards to hours of waking and sleeping. Keeping up long hours at night and late rising is bad for health. Amusements requiring presence in crowded rooms such as in theatre, cinema, *jatra*; the attendance to meeting etc should be avoided. Excitement is harmful and amusements and meetings are places of excitement. Vitiated atmosphere where people congregate is injurious to the system. The increase of the percentage of carbon dioxide has a contracting and therefore deleterious action on the uterus.

Mental and Nervous Condition .—Cheerfulness should be maintained during pregnancy. Irritation, grief, shock, anger, disgust etc. adversely affect pregnant women.

Attempts should be made to remove all sources of irritation. She should be kept cheerful by such care and delicate attention as the other members of the family may manage. Let her have good stories but no thrilling and exciting ones or ghost stories. Stories of difficult labour cases should never be taken up before a pregnant woman. The psychological effect of it is very bad. Fright induces some of the worst

ANTENATAL CARE

conditions of pregnancy She should not be given cause to be frightened under any circumstances

Sights of cruelty, slaughter of animals, household quarrels and disagreements affect adversely In medical books we find it reported that a pregnant woman was so shocked when a cruel boy stabbed a cat in the eye that though she delivered months after the incident, the child was a blind one It is no wonder that such things may happen A quiet, peaceful and cheerful life should be ensured for her

She must not feel lonely, at the same time she must, if possible, sleep alone in her bed and preferably on a *verandah* or in the open air to ensure free access of fresh air to the lungs

She must have proper sleep to keep her in a fit nervous condition

Sexual Intercourse —It is extremely unnatural and injurious to have sexual intercourse for a pregnant woman Physiologically it must be repulsive to her Normally she cannot be a willing participant in such an act The purpose of nature is served as soon as there is conception Ethically it is bad to have coition once the object of nature is fulfilled If coition is forced upon her, it serves to jar her nerves and injure both her and the child The parts remain so sensitive after conception, that it may be a conducive factor to abortion at any stage of pregnancy All religions have condemned it It should be avoided by all means

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From the point of view of asepsis, it cannot be too strongly condemned. We have detailed upon the care with which nature ensures asepsis in the vaginal canal and in the uterus from after conception. The practice of examination of private parts has been condemned very strongly. An act of coition is worse than an examination of private parts. It is wrong, dangerous and inhuman to force coition on a pregnant woman.

Warning Symptoms —If any of the following symptoms appear, a pregnant woman or her relations must seek for guidance at once and not neglect them on pain of severe consequences, however trifling these symptoms may appear at the time

1. Scanty urine
- 2 Persistent headache
- 3 Disturbance of vision or seeing of flashes of light before the eyes
- 4 Swelling of the face or the feet
- 5 Bleeding of any sort and in any quantity

Fainting sometimes occurs in pregnant women, these and some other abnormal symptoms are described elsewhere under : Abnormalities of Pregnancy.

General Examination

Where possible, there should be a general examination as a part of systematic antenatal care. In such examination, the state of nourishment should be observed and it should be noted whether the

GENERAL EXAMINATION

patient has normal weight proportionate to height, whether she is sickly, pale or plethoric

The heart and lungs should be examined for any abnormality such as weakness, palpitation, cardiac pain, breathlessness, pleurisy, bronchitis or asthma

Toxic conditions may be exhibited in various degrees and these should be carefully observed. The teeth and gums should be examined for pyorrhœa indicating toxins. The tongue should be examined to see if there is abnormality of digestion and if there are teeth marks or indentation. These are indications of toxins. Toxins should be sought for in pigmentation about the eyes. Toxic conditions increase during pregnancy.

Rheumatism which may indicate possibility of cardiac diseases should be sought for. She should be examined for any signs of tuberculosis. Those who are predisposed for tuberculosis or have it in a latent form invariably run the risk of getting active tuberculosis during pregnancy. Kidney diseases are bad for pregnant women for they may cause inflammation of the lining of the uterus or endometritis and thereby induce abortion. A disease so common as malaria is particularly bad for pregnant women and the current undeserved prejudice against the use of quinine in pregnancy makes the matter particularly serious.

Previous history of any venereal diseases such as gonorrhœa and syphilis should be taken note of.

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In case of multipara, the history of previous pregnancy should be explored to ascertain if she had abortion or gave birth to still-born child or if she had convulsions, premature labour or difficult or delayed labour.

Such examinations will indicate the lines of taking care of the case and help the prevention of undesired consequences.

SIGNS, SYMPTOMS AND DIAGNOSIS OF PREGNANCY

Cases happen when a woman shows some signs of pregnancy but is really not pregnant and is suffering from some disease or abnormality. In other cases pregnancy may be mistaken for a disease. There are cases in which the real condition is difficult to be found out and if the examiner is not careful, the conclusion from apparent signs of pregnancy may be far from correct. A widow may have a disease which has caused some superficial signs of pregnancy to appear. The life of such a woman becomes miserable. Although truth cannot be hidden for all times, yet for the moment she has to suffer great agony on account of the suspicion of those who are about her. In a particular case a widow had a swelling in the lower part of the abdomen and she began to pass urine many times as happens in the case of earlier months of pregnancy. She was suspected of having been pregnant. An expert was called in who in course of examination as to what was wrong, palpated the region and passed a catheter. A large quantity of urine came out and the swelling disappeared. What happened was that her bladder was not able to discharge itself normally. On accumulation of urine, a little quantity passed off.

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under great pressure of distension of the bladder while the accumulation gave a swelled appearance as if it was an enlarged uterus. On passing the catheter the obstruction in the passage was removed and the mistaken signs of pregnancy disappeared.

Sometimes a tumour either of the uterus or of the ovary accompanied with amenorrhœa and morning sickness due to certain diseases e g , anæmia, kidney disease, dyspepsia and some toxic conditions gives symptoms similar to those of pregnancy. These symptoms may wrongly be attributed to pregnancy. There may be a phantom tumour also mistaken for pregnancy.

On the contrary, it sometimes happens that a tumour is suspected in a case which in reality is one of pregnancy It may happen that years had passed off after the birth of the last child and then a tumour-like formation is felt in the lower abdominal region A tumour is suspected for pregnancy is ruled out of question on account of the previous history and also on account of the position of swelling which is not in the normal position of the uterus. To a careful observer these very symptoms might suggest it to be a case of extra uterine pregnancy. In cases of chronic gonorrhœa, women become barren—the connecting fallopian tube between the ovary and the uterus may become constricted and choked. After several years the chocking may be so slightly removed as to let a sperm to pass, but it may be too small to allow the fecundated ovum to travel through it to the uterus.

SIGNS AND SYMPTOMS OF PREGNANCY

Pregnancy then takes place within the tube or in the ovary All the signs of a tumour may then appear although it is really a case of extra uterine pregnancy

The symptoms of pregnancy are subjective as felt by the mother or described by her and objective as revealed by examination A woman may say that she has amenorrhœa, or that she has morning sickness and salivation, or that she feels the quickening All these may be there and still the woman may not be pregnant or it may be that she imagines or says deliberately that she has these symptoms but she is not pregnant nor has those symptoms What she says cannot be tested Therefore these subjective symptoms are not of much value in correctly and definitely determining a case of pregnancy

From the second month a pregnant woman begins to feel the abdomen to be heavy This also is one of the subjective signs

Amenorrhœa —Normally after conception has taken place, the menstrual flow ceases This is one of the signs of pregnancy But the opposite of it may happen A pregnant woman may continue to menstruate although the flow may be small or insignificant On the contrary, the menstrual flow may cease due to some diseased condition and conception may take place when she is already suffering from amenorrhœa due to disease Therefore it is not an absolute sign of pregnancy No one should think that because there is the stoppage of menstruation, the woman is necessarily pregnant

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Salivation.—During the early stages salivation occurs. Profuse saliva begins to accumulate in the mouth. Salivation is often a symptom of acid condition of the stomach. Salivation occurs in some diseases of the digestive system. It cannot therefore be regarded as a reliable sign of pregnancy.

Morning Sickness :—There is a tendency to vomit in pregnant women particularly in the morning. Morning sickness appears after the first month but it may appear as early as the first week of pregnancy. In some women it may continue after the 4th month. Again there may be morning sickness without pregnancy. So its presence or absence does not prove positively the presence or absence of pregnancy. It may be said only that it is a fairly constant symptom of pregnancy.

Quickening :—A multipara feels the movements of the child in about four and a half months of pregnancy. This is generally not so early in the case of a primipara who feels the movement a few weeks later. The movement is like that of a fish in water, for the uterus contains water (liquor amnii) which surrounds the foetus.

The objective symptoms which can be found by examination are breast and abdominal signs. The primary and secondary pigmentations of the breasts and feel of the breasts etc. are the breast symptoms. The abdominal symptoms are feel of the uterus, foetal heart sound, foetal movements and uterine contraction.

External examination which consists of inspection, palpation, percussion and auscultation will reveal these signs

SIGNS AND SYMPTOMS OF PREGNANCY

Breast Signs —The breast signs begin to appear from the second month. The breasts become larger, harder and firmer and a black pigmentation or primary areola encircles the nipples which become more prominent. As pregnancy advances, follicles or little pimples appear on the primary areola. On squeezing

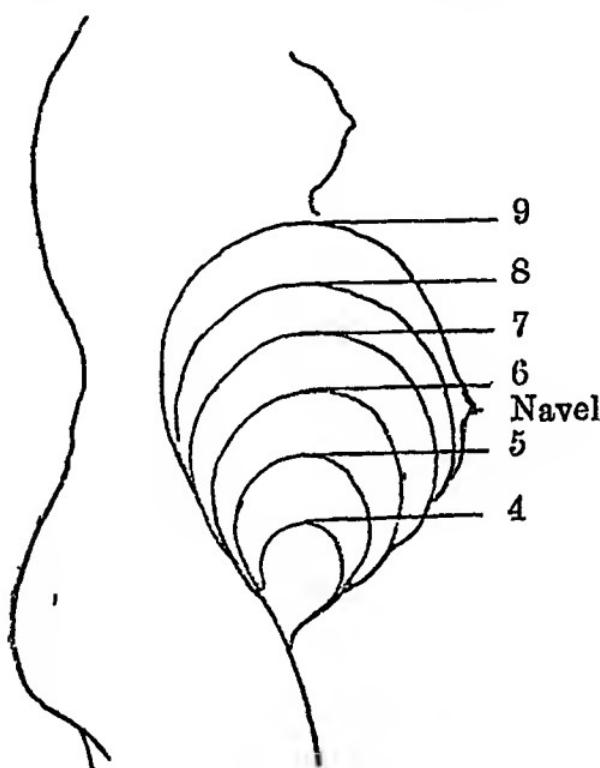


Fig 188 Protuberance.

the nipples, a thick fluid or colostrum comes out. On the fifth month the pigmentation of a lighter colour appears surrounding the primary areola.

For the abdominal signs the abdomen has to be inspected for protuberance.

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During the first three months of pregnancy, the uterus remains within the pelvic cavity and therefore there is no ostensible protuberance. On the 4th month it comes up a little above the symphysis of pubic bones. On the 5th month the protuberance reaches up to an inch below the umbilicus and on the 6th it reaches the level of the umbilicus. On the 7th month it goes up three fingers above the umbilicus and on the 8th month it rises higher and reaches half way between the end of sternum or the breast bone and the umbilicus. On the 9th month the protuberance touches the margin of the ribs while on the tenth it descends down to the level of the 8th month because the abdomen bulges out still more.

On palpation the uterus may be felt on the fourth month by placing the hand on it. As the pregnancy advances, the size of the uterus increases and palpation reveals the position it occupies and its contour from which much may be known about the stage of pregnancy. By the fifth or sixth month the foetal parts may be felt. The foetus which normally is like a small overturned pitcher now becomes globular, smaller and hard. The uterus contracts on touch and this is a very significant sign of pregnancy.

Percussion :—From the fifth month the uterus may be located by percussion. It gives a dull sound at centre while beyond the uterus the area is very resonant.

Auscultation —The foetal heart sound may be felt from the 5th month specially if the pregnant woman is

SURE SIGNS OF PREGNANCY

thin For very fat women, it is difficult to obtain foetal heart sound early. As the pregnancy advances, the foetal heart sound becomes more audible

About signs it may be said that some of these are definite (1) Feeling of the uterine contractions, (2) the movements of the foetus, (3) hearing the foetal heart sound (4) feeling of foetal parts are to be regarded as sure signs In their absence pregnancy cannot be concluded from any subjective or objective symptoms If however the subjective and objective symptoms agree, probability increases. For example, if a woman says that she has ceased to menstruate for the past five months and if her breasts show pigmentation and nipples on squeezing yield a thick fluid and if the uterus has grown to such a size as to be within an inch of the umbilicus and if on percussion the characteristic dulness in the centre and resonance outside are found then it may be concluded with fair certainty that the woman is pregnant In order to be definite the sure signs of foetal heart sound and the movements of the child etc. should be sought for and obtained So long as one of the sure signs is not obtained, the case should be put down as only a probable one

We may sum up the signs of pregnancy chronologically The signs of pregnancy appear one after another and as the pregnancy advances every month, fresher symptoms are added till the 7th month after which some of the symptoms simply intensify Morning sickness stands by itself and is the only

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symptom which commences within the first four weeks of pregnancy and disappears about the fourth period of four weeks or the fourth month. Chronologically each period is taken as one of four weeks instead of one month. Popularly four weeks may be calculated as one month of pregnancy for reasons given hereafter. The signs are chronologically are :—

- 1 Amenorrhœa
- 2 Primary pigmentation of the breasts
3. Secretion from the breasts
4. Appearance of follicles on the breasts
5. Uterus may be felt by the hand and feeling of uterine contraction
6. Larger area of pigmentation
7. Quickenings
- 8 Fœtal heart sound
- 9 Fœtal movements felt from outside

Chronologically they may be arranged as under :—

Period	Symptoms
First 4 weeks	1
Second , ,	1, 2
Third , ,	1, 2, 3
Fourth , ,	1, 2, 3, 4, 5
Fifth , ,	1, 2, 3, 4, 5, 6, 7, 8
Sixth , ,	1, 2, 3, 4, 5, 6, 7, 8
Seventh , ,	1, 2, 3, 4, 5, 6, 7, 8, 9
Eighth , ,	Eighth onwards the foetal heart sound and foetal movements become more prominent.
Ninth , ,	
Tenth , ,	

DIFFERENTIAL DIAGNOSIS OF PREGNANCY

In tumours and some diseases the abdomen may get distended and some apparent signs of pregnancy may appear In some cases there may be so many symptoms of pregnancy present except the sure signs that it is difficult to say definitely whether it is a case of pregnancy or not Even experts may make mistakes The commoner sources of semblances are Uterine tumour, ovarian tumour, distended bladder and phantom tumour

In uterine tumours the menses do not stop, on the contrary, there may be menorrhagia The uterus begins to grow larger in size but a difference may be found by percussing it While in pregnancy the contour of the uterus is smooth and ovoid , in a tumour it shows a ragged unsymmetrical edge having pronounced protuberances The growing size of the uterus does not correspond with the graded growth month by month as described before Last of all, the surer signs of pregnancy, the contraction of uterus, the foetal heart sound or the movement of the child are absent on and after their due periods of appearance

Ovarian Tumour —In this case also there is usually no amenorrhœa It is present only in cases where both the ovaries are diseased But it differs from pregnancy in that the position of protuberance is

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usually not central but one-sided as the ovaries are situated on either side of the uterus. If there is extra uterine pregnancy in the ovary, the protuberance also would be on one side but in any case a tumour will not develop the sure signs of pregnancy.

Distended Bladder :—Unusual retention of urine may give rise to a suspicion of pregnancy of the earlier months. In the earlier months the bladder is pressed and there is some protuberance. In cases where there is some obstruction, there may be always a residual quantity of urine in the bladder giving rise to protuberance. In such cases the passing of catheter will drain away the urine and the protuberance and frequent micturition, similar to signs of pregnancy will disappear.

Phantom Tumour.—A hysterical woman anxious to have a child, may believe that she is pregnant and then simulate many of the commoner signs of pregnancy. Even the abdomen will begin to protrude. But this self-deception and deception to others cannot continue long. The graded growth of the size of the uterus and the sure signs of pregnancy will not be present.

Finding out the Period for which a Woman is Pregnant

In diagnosis of pregnancy or in calculating the normal expectation of the time of delivery or in treating cases of diseases during pregnancy, where

CALCULATION OF MONTHS OF PREGNANCY

a pregnant woman remembers the date of last menstruation it is easy to calculate the period. Normally delivery takes place on the 10th menstrual period. What is popularly calculated as months in pregnancy should correctly be menstrual periods. The menstrual period varies with individual. While most women menstruate every 28 days there are others who do so variously every 30th day to even every 25th day. In normal menstruating women having 28 days' interval, the time of delivery will come on the basis of 10 menstrual periods to 280 days. Those who menstruate every 30th day, delivery may be postponed till on the 300th day while those who menstruate every 25 days may have a full term delivery on the 250th day.

The menstrual period is a critical period for women normally and during pregnancy. Those who can find out by calculation their menstrual periods will do well to be particularly careful during those periods. Most abortions take place at the period when there would be menstrual flow if she were not pregnant.

Where a woman does not remember or cannot say definitely when she last menstruated, then one has to depend on signs for determining the period of pregnancy. When a woman ceases to menstruate for other reasons and then after a time conceives, she may put the period of pregnancy several months ahead and become anxious by not developing the signs normal for those months.

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In these cases other signs of pregnancy will have to be looked for. The size of the uterus gives a fair indication. For example, if the uterus cannot be felt from outside then it must be within the pelvic cavity and pregnancy would be within the third month. If the protuberance reaches the navel then it would follow that she is likely to be six months pregnant.

These calculations may be corroborated from the fifth month onwards by feeling the quickening of the foetus. The time at which a multipara feels the quickening is the 18th week of pregnancy and for a primipara it is the 20th week. For example, if a primipara felt the quickening for the first time a month ago, then it would be safe to conclude that she is pregnant 20 plus 4 or 24 weeks. Such probability may be verified by the signs enumerated chronologically.

It is worthwhile to remember that no single symptom can be absolutely depended upon as to the period of pregnancy, all signs taken together may give a fairly correct idea. It will not do to depend upon the mere statement of a pregnant woman about her period of pregnancy, the symptoms must be analysed and corroboration to the statement obtained in arriving at the period of pregnancy.

Condition of the Child

It is natural for a pregnant mother to wish to be sure that the child is growing normally. If there is

CONDITION OF THE CHILD

any illness or anything abnormal at once her thoughts go to the child and any medical man called in to see her has to reply to the question as to how he finds the child to be.

If there is sign of life, one can be positive and say definitely that the child is well. But if there is no sign of life, then nothing can be definitely concluded from this negative fact. It can only be said that positive signs of life, the foetal heart sound or the sound of rush of blood through the umbilical cord or the movement of the child are not found.

When a child dies, premature labour is induced. But this may not be so in all cases. Then other signs have got to be looked for. A sure sign is the commencement of flow of fetid discharge from the vagina. It is a proof of the fact that the child is dead and that expert help should be obtained to empty the uterus. In the absence of this discharge, if one can wait, it will be well to mark the development of the uterus. It may be difficult by mere sight to make a comparative idea as to the protuberance of the abdomen after the lapse of a week or two during which a pregnant woman may be watched for coming at a definite conclusion regarding the life of the foetus. A mark may be put up to where the protuberance has reached. For this purpose a streak with tincture iodine or silver nitrate solution may be put which may last a fortnight. A measurement may be taken at the line. If after a fortnight the measurement does not increase, then it

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would be safe to conclude that the child has not grown during the interval and that there is something very wrong and that expert help should be obtained. If the size shrinks or if the breasts become softer, the indication will be that the child is probably dead.

If at one time the sure signs of life were obtained and then they ceased, or if there is the history of tumultuous movements of the child followed by cessation of all movements then death should be suspected

ABNORMALITIES OF PREGNANCY

Pressure Symptoms — In pregnancy swelling sometimes occurs There may be swelling of the face, legs and sometimes the veins may become prominent or what is known as varicose veins may appear in which they have rope-like twisted prominent appearance

If there is swelling, it is necessary for a village doctor to analyse the urine and to detect the presence of any albumin The test is simple If albumin is present then the swelling is due to the heart or kidney disease Oedema or swelling of the face is usually due to heart disease If the heart is good and there is no albumin in the urine then these swellings may be due to pressure of the uterus on the veins

If albumin is found in the urine or if the heart is weak œdema should be regarded as a grave symptom being premonitory to toxæmia, which is dealt with hereafter

Due to pressure of the uterus on veins and consequent obstruction to free flow of blood, the veins swell The external genitals may also develop œdema Formation of piles, frequent micturition are other pressure symptoms Pressure on the bladder is greater during the earlier months Later on when the uterus increases in size, the region of the bladder is

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less pressed, the pressure being higher up. Therefore as pregnancy advances, the tendency to micturate frequently diminishes

In case of swellings due to pressure, care is to be taken of the case in the following manner :

It will be observed that the swellings are almost imperceptible in the morning and increase gradually during the day. This fact automatically points to the need of rest.

As a matter of fact rest is one of the principal remedies in pressure symptoms. The patient should lie down and thereby help blood to flow back to the heart without difficulty.

Anxiety of all kinds should be removed from the mind of the mother. Anxiety is bad both for the mother and for the child. Mental strain tends to increase blood pressure and thereby aggravate the difficulty created by the pressure of the uterus. Constipation may be one of the fruitful causes of these pressure symptoms. In order to relieve constipation mild purgative like myrobalan should be taken. Enema is of great help in relieving accumulations in the bowels and acts very efficiently in curing piles. As a general rule, a pregnant woman should have two motions per day. Failing this, the aid of enema should be taken wherever possible

TOXÆMIAS

Toxæmias are due to toxic condition or poisoning of the system. There are two diseases, excessive nausea and vomiting and eclampsia which may be classed as major toxæmias. There are also milder cases of toxæmias. For toxic conditions the remedy will lie in detoxicating the system.

The toxic substances are thrown out of the body through the lungs, the skin, the kidneys and the bowels. These excretory organs should be helped in two ways, first by taking the load off them if there be any and secondly by helping nature to function normally and vigorously.

As for the lungs deep breath should be taken. This induces the lungs to inhale and exhale larger quantities of air in a given time and therefore enhances elimination and reduces the toxic symptoms. Care should be taken to see also that she has plenty of free air at night during sleep when the excretory processes are more actively at work. Sleeping out in the open air will do good. A covered verandah may serve when it is not possible to sleep under the open sky. If there is cold, the body should be properly covered, but the nose should be kept uncovered.

The skin throws off the toxins as perspiration. This natural process should be helped. Walking may induce perspiration. Application of heat by way of

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hot bath or steam bath or alternate application of heat and cold are good methods for inducing perspiration. These are described in chapter V.

The action of bowels should be free. At the appearance of toxic symptoms, the patient should be given a laxative such as myrobalan, two or three fruits at bed time Magnesium sulphate should be given. In addition to giving magnesium sulphate the colon should be washed out with an enema where possible

The kidneys should be helped to eliminate by taking in large quantity of water The more water is taken the better. Barley water consisting of a spoonful of barley boiled with a pint or two of water and with a little salt and lemon will be a good drink

The formation of toxins within the body should be minimised by regulating diet Where toxæmia is apprehended or has appeared, all solid food should be stopped. The patient is to be kept on milk diet and fruit juice. According to the gravity of symptoms, milk should be discarded and the patient kept up simply on water, fruit juice and vegetable soup.

Hyperemesis or Excessive Nausea and Vomiting

Cases are met with where nausea which is a common symptom in early months sometimes develops in alarming proportions. It is not confined to morning In such cases it happens then that even water cannot be retained. There may be excessive

HYPEREMESIS

nausea due to hysteria also. But this is non-toxic and the patient can retain some food although most of it may be thrown out.

Deprivation of food for sometime would not have mattered much. The inability to retain water however is a serious thing. Elimination is greatly hampered on account of diminished intake of water or its stoppage and then the condition may become very grave.

In ordinary morning sickness the distress in certain cases is great. In fact the distress and nausea may in some cases verge on to the graver condition known as hyperemesis. In morning sickness also the patient may not retain anything by the mouth. In such cases the patient should be placed in a quiet place and should not be allowed to move about. The room should be darkened. The first thing in the morning would be to give her a pound of water containing a dram of soda bicarb. Very likely this will be thrown out. Yet it will have the effect of washing out the stomach and of soothing the patient. Nausea may for the time disappear and she may retain something given then. Food should be given in small quantities. Sugarcane can be chewed with advantage. Gourd and pumpkin twigs boiled and salted may be chewed and the juice retained. Sometimes solid food agrees with the patient. A few ounces of soft rice, papaya or bael, mangoes or cocoanut etc. may then be given with advantage. Potass bromide in full doses will often check nausea and vomiting by depressing the nervous system.

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When the conditions become very serious, then the case becomes one of hyperemesis. In such cases all steps should be taken to detoxicate the system by adopting methods of elimination. It may be necessary to introduce intravenous saline to keep the blood in proper fluid condition. Rectal feeding by nutrient enema may be attempted

When however all these fail and the life of the mother is in danger, then in those very rare cases experienced doctors take the ultimate step of emptying the uterus to save the mother. But this should be reserved for specialists or very skilled men in the profession

Eclampsia

It is a series of convulsive fits which generally occur in pregnancy as a result of absorption of some toxins in the system. It manifests itself usually in last three months of pregnancy. It is preceded by œdema of hands, feet and face, diminution of urine with high colour, continuous giddiness for 24 hours, dimness of vision or flashes of light before the eyes, pain in the upper abdomen, feeling of drowsiness without any apparent reason, sleeplessness, and a feeling of tiredness and dyspnœa in moving about. Any one of these or a combination of several with slight rise of temperature and pain in the loins always indicates that some sort of toxins are being absorbed in the system. But in very rare case eclamptic fits may occur without

ECLAMPSIA

any premonitory symptoms whatsoever. If urine is examined at this period it will be noted that albumin is present. If treatment is not commenced, then symptoms may aggravate and give rise to a sudden attack of convulsive fit with short interval between attacks in graver cases and long intervals with shorter duration in mild cases. Any way, whether mild or grave, eclampsia requires immediate attention, otherwise it is very serious, mortality of eclampsia being very high.

It may occur in any age and though common in women of first pregnancy is also found in multipara. The attack, though the predisposing cause may manifest from earlier stages, expresses itself generally from the 7th month to the 10th month and may be prior to delivery or during or even after. So if in any case, any primipara complains of any of the above symptoms, steps should at once be taken to prevent the development of eclampsia. It is often seen that village women folk very much overlook and neglect the first warning of the disease manifested by swelling of the feet and legs believing that it is due to pressure on the abdomen and will pass off later and the result may be disastrous.

When premonitory symptoms of eclampsia are found, it would be advisable for the village doctor to begin detoxication at once by the methods already mentioned in general. By attending the case at the first sign of danger, many lives may be saved. It would be an unwise and irresponsible act to neglect

PREGNANCY : CARE OF MOTHER AND CHILD

the premonitory symptoms and wait till the actual fits occur. For, as has been mentioned, once the fits occur the prognosis is bad. By taking care for detoxication at the very first appearance of suspicious symptoms, there will be nothing wrong if the case after all is not one of eclampsia. Albumin may be present in urine for other reasons but it is advisable to work upon the suspicion of eclampsia.

Management :—When only the predisposing factors appear and no actual fit still commences, observe the following points very carefully.

Detoxicate according to the principles laid down. There should be free purgation and use of enema. The quantity of fluid should be increased daily when the patient becomes accustomed to the use of enema. The enema should be given slowly at low pressure, while the nozzle should have a catheter so that the colon may be washed out.

Flush the kidneys by giving plenty of water to drink such as plain water, barley water, cocoanut water or sweetened soda water or whatever the patient may choose to have.

For diet nothing but boiled vegetables with water and fruit juice should be given. Continue this routine for 5 to 7 days but even after this, there will be need for caution. When there is no trace of danger signs, the patient may be very slowly given her normal diet—major portion of which say 75% should consist of vegetables, vegetable soup and fruits.

MANAGEMENT OF ECLAMPSIA

Where there is a premonition to eclampsia before labour sets in, the village doctor should take warning and obtain help of an experienced doctor or a specialist. Where it is possible to send the patient to a distant place to get proper medical help, she should be removed in a palanquin or *dooly*, without any jerking to the place of the doctor.

Convulsive fits may be due to hysteria or epilepsy. But during the last three months of pregnancy, any fit should be taken seriously and detoxication proceeded with.

If the village doctor has to take up such a case, where detoxication has failed, and where no experienced doctor is available, he should proceed as under when the fits are coming but the patient is not in labour.

(1) Keep the patient in a dry airy room but away from light as far as practicable. The bed should be soft otherwise limbs may be injured. Avoid possibility of the patient falling down from the top accidentally by arranging for bed on the floor.

(2) The patient should not be allowed to remain on her back continually, she should be allowed to rest on sides and change sides every hour.

(3) The patient should be prevented from biting her tongue. For the purpose a handle of a spoon should be wrapped with a bandage about half an inch thick and then should be pushed between the teeth while the fit is on. The patient should not be allowed to throw her limbs about as they may get injured.

PREGNANCY . CARE OF MOTHER AND CHILD

(4) The stomach should be washed with soda bicarb solution and then medicines should be given in between the attacks and should chiefly be comprised of bromides and magnesium and sodium sulphates. Diets should be given during interval of attacks

(5) Apply continuous cold on head and back of neck.

(6) Never give anything by the mouth either medicine or diet when the patient is unconscious

(7) In case the temperature is high, wet packs are advisable, care being taken against collapse or of catching cold.

(8) Other symptoms which may arise in course of fits should be treated as they occur

Remember that shorter duration of fits with longer intervals is a better sign, whereas longer duration of fits with shorter intervals and unconsciousness is almost a fatal sign for which the only treatment is emptying the uterus by a specialist if the fit comes before full term

If the fits continue, morphia may be given under direction of an expert. The bladder and the bowels should be relieved by catheter and enema. Expert help is very necessary, for it may be that the uterus should be emptied.

In after-delivery case of eclampsia, the whole attention should be diverted towards sedatives, diuretics and purgatives. If there be excessive haemorrhage beforehand, saline must be given by any possible route immediately. Rectal saline with

MINOR TOXÆMIAS

glucose and bromide salts may be continued with other saline routes

In all cases of eclampsia and in all its stages detoxication should be the chief plank for treatment and management

If not in Labour Pain —Wash out the stomach and introduce 30 grains of potass bromide or chota chandra with the last 4 ounces of water after wash This often serves to stop recurrence of fits

Minor Toxæmias

Pruritus, neuralgia, excessive salivation are other minor toxæmias

In pruritus test urine for sugar If sugar is found regulate diet and avoid starchy food or tuberous food Fruits and boiled vegetables with soup should be depended upon

In neuralgia and excessive salivation detoxicate and restrict the patient to fruits and vegetables If severe, keep the patient entirely on fruit juice for sometimes or if possible let the patient fast for a day or two taking water only

BLEEDING DURING PREGNANCY

Abortion

It is a painful fact that every 5th child in India meets a premature death in the mother's womb and that mostly by abortion. An abortion is the expulsion of the foetus from the uterus before the complete formation of the placenta.

Abortion is most common during the first three months of pregnancy. In the next three months, miscarriage is rare and during the last three months the number of deaths in womb is greater than the second three months, but the number is insignificant as compared with that for the first three months. Abortions taking place within the first three months therefore largely fill the dismal picture. This enormous waste of life is preventable and by proper care the number of cases may be very considerably reduced.

Abortion may be induced by direct production of contraction in the uterus brought about by drugs in poisonous doses, in injury, by excessive physical exercise, mental excitement, sexual intercourse or by mal-position or mal-development of ovum in the uterus. Abortion may be due to the death of the ovum owing to the above causes or by disease like syphilis etc.

VARIETIES OF ABORTION

When there is a bleeding in the first three months of pregnancy then it may generally be taken as a case of abortion except in the very rare case (1 2000) of extra uterine pregnancy—the characteristic bleeding of which is different from that of abortion. Abortion may be generally divided into two main divisions (1) threatened abortion (2) inevitable abortion. Inevitable abortion may again be a case of (a) incomplete abortion in which a portion of the foetus comes out, (b) missed abortion in which the foetus is dead but has not been expelled or lastly it may be case of (c) excessive bleeding which makes abortion inevitable as it endangers the mother's life if not immediately stopped.

Examination will reveal whether a case is one of threatened abortion or of inevitable abortion. The case of excessive bleeding in which any delay to be dangerous may be diagnosed at sight but for other cases the discharges have to be examined. An examination of the discharges may not yield sufficient material for diagnosis at the time of the first examination of the patient. She should be asked then to keep all discharges and clots that may come out and also the soiled pads or clothes. Till a diagnosis is definite it will be well to examine the discharges twice daily in the meantime proceeding with the case as one of threatened abortion.

When examination reveals that portions of the foetus have come out then the case is one of (2a) incomplete abortion. If there are fetid discharges

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or discharges have lost the colour of blood, are dark or reddish and watery or again if there is fever accompanying discharges then (2b) missed abortion or abortion in which the foetus is dead and is waiting for expulsion or is creating mischief, is to be suspected. The first or subsequent examination may further reveal that the complete foetus has come out during bleeding. It is then a case of complete abortion and if bleeding has stopped, nothing need be done beyond ensuring aseptic conditions as are to be taken in a case of delivery. If she continues to bleed, then such steps are to be taken as described for cases of after-delivery bleeding.

(1) Threatened Abortion

In threatened abortion there is profuse bleeding accompanied with comparatively less pain. In all cases of bleeding the following steps have to be taken :

(1) Put her at once to bed and stop all movements. Complete rest is a great contributory factor to recovery. This should continue for at least a week after all bleeding stops. The rest should be complete in a wide sense, both physical and mental. Let her not be disturbed on any account.

(2) Relieve the bowels by an enema.

(3) Keep her on low liquid diet preferably on fruit juice. Milk and barley or sago may be added. No solid food should be given till bleeding stops.

VARIETIES OF ABORTION

(4) In order to soothe the system potass bromide or chota chandia in 30 grains doses may be given.

With proper care many cases of threatened abortion recover to normal condition. It has been known that after bleeding for even two and a half weeks, patients recover and have full term normal labour.

(2) Inevitable Abortion

(a) **Incomplete Abortion** — If at the time of first seeing the patient or at any subsequent examination it is found that any fleshy matter is coming out, then it will indicate that the foetus is dead and portions of the foetus are coming out. If there is fever it will indicate sepsis. In such cases urgent steps are to be taken to empty the uterus for which an experienced medical man should be called in. If such medical help is unobtainable then such emergency steps are to be taken as are described under excessive bleeding (c) for emptying the uterus.

(b) **Missed Abortion** — When no parts of the foetus have been found with the discharges but the discharges have become dark or watery and reddish or fetid with or without fever, it is to be concluded that the child is dead and no time should be taken in emptying the uterus. For this purpose the village doctor should proceed as in the case of an incomplete abortion.

(c) **Excessive Bleeding** — If the bleeding is excessive, if an examination of the patient's general condition and pulse shows that the bleeding has gone

PREGNANCY : CARE OF MOTHER AND CHILD

on to the danger point and that further time should not be lost before stopping bleeding then the village doctor is to sacrifice the life of foetus in order to save the mother. For stopping bleeding in such cases the passage should be well plugged so that the opening of the uterus may be closed.

The following' technics are to be observed in plugging :

The mother should lie on her back and she should be asked to pass urine which is to be collected in a pot without soiling bed. In the meantime the attendant should clean her hands by soap and water taking particular care about cutting the nails and removing dirt from under the nails. After urination the parts should be well cleaned with warm water The hands of the attendant should again be washed and dipped in a solution of tincture of iodine diluted with water so as to have a faint tint Then put the index and the middle fingers of the left hand within the passage as far as they will go and use the same two fingers of the right hand for pushing in a plug If the ends are forced in, then keep a count of how many pieces have been pushed so that at the time of removal none may be left inside and cause future trouble and sepsis. The plugs are to be removed after 24 hours But if the plugs get soaked and blood begins to flow earlier they should be removed and fresh plug put in.

Plugging serves to stop the drainage canal. But this cannot immediately stop the bleeding at its

TREATMENT OF ABORTION PLUGGING

source within the uterus. Blood accumulates beyond the plug and after a time exerts pressure upon the bleeding surfaces. This stops bleeding. But this does another thing also. It makes the uterus contract under the pressure which then makes it expel its contents. In excessive bleeding in order to save the mother's life, plugging is necessary and effective. But in cases of threatened abortion plugging will induce abortion rather than stop it and therefore should not be attempted. Again in bleeding of incomplete abortion or that of missed abortion when the foetus is dead plugging is also contra-indicated as it is likely to help decomposition and produce sepsis.

If there is extreme pain opium in one grain doses may be given.

But bleeding may be profuse and the patient may succumb if it is allowed to continue. Active treatment is then necessary. It is to complete the abortion by detaching the ovum from the uterus and expelling it out. The operation should be performed under chloroform but if there is no arrangement and no expert is available and blood seems to drain out life, attempt may be made without chloroform. This is brought about by passing the left hand into the vagina and introducing a finger into the uterus. The ovum is detached from the uterus by the finger.

The finger is then withdrawn and placed against the neck of the uterus from outside. The right hand is placed on the abdomen sunk against the uterus. The uterus is compressed between the two hands so that

PREGNANCY : CARE OF MOTHER AND CHILD

the ovum is squeezed out and drops into vagina from which it is withdrawn. The uterus is well douched with warm boric lotion. Bleeding and other distresses now end if proper antiseptic precautions have been taken. If the ovum is already dead and part has come out, the adherent portion will have to be taken out in the manner described above. In case of incomplete abortion it is dangerous to leave the patient to nature expecting that the remaining portion of the placenta or ovum will come out by itself. Sepsis is bound to follow.

Miscarriage which is abortion happening after the 3rd month is caused by the same factors enumerated in the case of abortion. These cases are treated in the same manner as full term labour and the after care of miscarriage is also similar to that of full term delivery.

Extra Uterine Pregnancy

In bleeding during the first three months there is just a remote chance, 1 in 2000 of the cases being one of extra uterine pregnancy. The village doctor should not lose sight of this fact also. In extra uterine pregnancy, there is little bleeding while there is much pain. The abdomen is tender and is under tension. In extra uterine pregnancy while there is little discharge of blood outside, internal haemorrhage may be going on. Signs of internal haemorrhage should be watched for in case of bleeding with severe pain during

EXTRA UTERINE AND MOLAR PREGNANCIES

the first three months of pregnancy In internal haemorrhage the pulse becomes feeble and frequent, the look becomes anxious, temperature is subnormal and the patient is collapsed In extra uterine pregnancy a cast may be thrown off from the uterus and examination of the discharges will reveal this In a case of suspected extra uterine pregnancy, an experienced doctor or a specialist's aid should be taken, for it is a very serious matter

* Bleeding During the Second Three Months of Pregnancy

Bleeding during the second three months is rare Should bleeding occur, the management should be as in the case of bleeding during the first three months Bleeding during this period may very rarely be due to molar pregnancy It so happens, although very rarely being 1 in 2000 cases, that the foetus dies in the first or second month and a cluster of grape-like growth begins to form within the uterus The vesicular moles cause bleeding from the 4th to 6th months and sometimes get cleared of the uterus during bleeding Bleeding may be so copious as to be a serious thing

Molar pregnancy may be suspected by abnormality in the protuberance of the abdomen The growth here may be disproportionately larger It may also be smaller where the foetus is converted into fleshy mass. If the duration of pregnancy is correctly

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ascertained and if the growth is disproportionate and if there is found no sign of life on careful examination, quickening is not perceived by the mother and if the discharge is not red coloured but dark or watery or if there is fetid discharges, then molar pregnancy may be suspected. Expert help

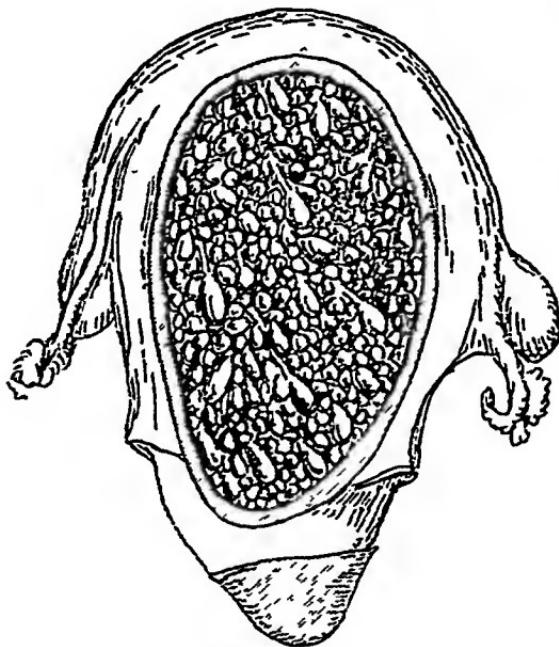


Fig 184
The uterus containing vesicular moles.

should be taken to empty the contents of the uterus in such a case.

Bleeding During the Last Three Months of Pregnancy

During the last three months the child is viable or capable of living in case of premature delivery.

PLACENTA PRÆVIA

Bleeding during this period is rare Bleeding at this period may be divided into two groups . (1) In which the placenta is attached in its normal position to the uterus (2) In which the placenta is abnormally placed in the uterus The abnormal attachment may be centrally at the cervix or at the side near to the cervix or a little higher up

Where the placenta is normally attached, bleeding may be due to some injury or shock or to diseased condition of the uterus The uterus may get contracted on account of protracted fevers and cause bleeding

In placenta Prævia or abnormally placed placenta bleeding is not accidental but is unavoidable on account of the very position it occupies Treatment of bleeding during the last months of pregnancy will depend upon whether the placenta is normally situated or not. Without this diagnosis any blind steps taken to prevent bleeding are likely to injure both the mother and child The position of the placenta cannot be determined without an internal examination by an experienced person

If the examination reveals that the placenta is normally situated then proceed with the case as detailed for abortion If on the contrary, it is found on an examination that the placenta is placed abnormally on the uterus, then the matter should require an expert aid In such case every possible means should be taken to put the patient under the care of an efficient doctor or she should be taken to him

THE CONFINEMENT ROOM AND IMMEDIATE REQUIREMENTS

In different provinces there are different customs for providing accommodation for a pregnant woman for delivery. Amongst the Hindus in many places, a temporary hut is erected without any windows and in everyway unfit for human habitation. The room where child birth takes place is regarded as an untouchable structure, to be destroyed after use. All the rules of sanitary living are thrown to the winds in the construction of such lying-in huts and the society pays for this ignorance by an appalling child death rate and also high mortality of mothers after delivery. Everything should be done to remove this custom and impress upon the relatives the necessity of housing the delivery case in a room suitable for a serious surgical operation. The best room that can be spared should be chosen. No temporary huts of the nature described above should be used for the purpose. The floor should be dry and furniture if any, should be removed from the room except a bed for the patient. The room should be thoroughly cleaned. A mud hut with mat or earth plastered wall is generally all that we have in villages. But such a hut if well-ventilated, dry and kept fresh and clean with earth and cow dung *leps* will be quite suitable for the purpose of confinement and after

CONFINEMENT ROOM AND REQUIREMENTS

If there are no windows in such a hut, several windows should be provided Lying-in room should be a lighted and well-ventilated one If there has been case of infectious disease to persons, then rooms should not be chosen

The bedding or mattress intended for use at delivery should be previously sunned for several days Those articles of clothing and bedding that can be washed or boiled should be washed or boiled before use Old used articles may harbour various bacteria and these may do incalculable harm both to the mother and baby unless they are boiled, washed and sunned as the case may require

Preparatory to delivery the following articles which a poor man in a village can afford to have, should be got together

A bed, clean and dry

Several pieces of old clothes, washed by boiling with soap and soda and sun dried, kept neatly folded in a bundle

Earthen-ware vessels for washing, vessels for boiling water

Vessels with cover to receive washings and other refuse matter to be thrown away after use

Some wood charcoal for making fire

Thick cotton threads for tying the umbilical cord boiled in water.

Some bland oil such as til oil or cocoanut oil made sterile by heating, then cooled and kept in a clean dry phial

PREGNANCY : CARE OF MOTHER AND CHILD

Small metal cup for oil for anointing

A piece of toilet soap.

The householder should be given a supply of the following articles by the advising village doctor who may keep these ready for all delivery cases. The attendant dhai should be taught their use

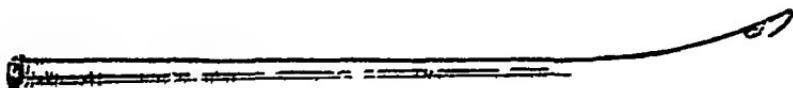


Fig. 185.
A female metal catheter

1. A pair of sharp scissors
2. Boric lotion for the eyes
3. Boric and arrowroot powder for dusting
4. Soap for washing
5. Tincture iodine
6. A female metal catheter
7. A douche-can for enema

NORMAL LABOUR

Mechanism of Labour

In labour three things are concerned—power, passage and passenger. Here the child is the royal passenger whom so long the mother has unconsciously nursed in the uterus. Its first home, the uterus has become now too small for it. The uterus is the home and the host also. The uterus arranged so long everything for the child and now it must send the child to the outer world, from the womb to the mother's lap.

The power, it must be explained, is not the power of uterus alone. The action of the uterus is entirely involuntary. But at a certain stage of delivery the mother becomes the source of power also and responds to reflex stimulus in helping to throw the child out.

The passage can be divided and named according to the route followed in the royal march of the child to delivery. In the first stage the passage concerned is the neck of the uterus or the cervix. In the second stage the pelvic cavity is the passage and the recipient of the passenger and last of all lies the vaginal canal as the passage.

The passenger is the child, but being a royal passenger it has its retinue too, the pioneer and the rear guard. The pioneer is the bag of membrane

PREGNANCY : CARE OF MOTHER AND CHILD

containing liquor amnii or watery membrane which marches ahead of the child till the cervical canal is fully dilated for the passing of the child. After the child comes the placenta which also has to follow the

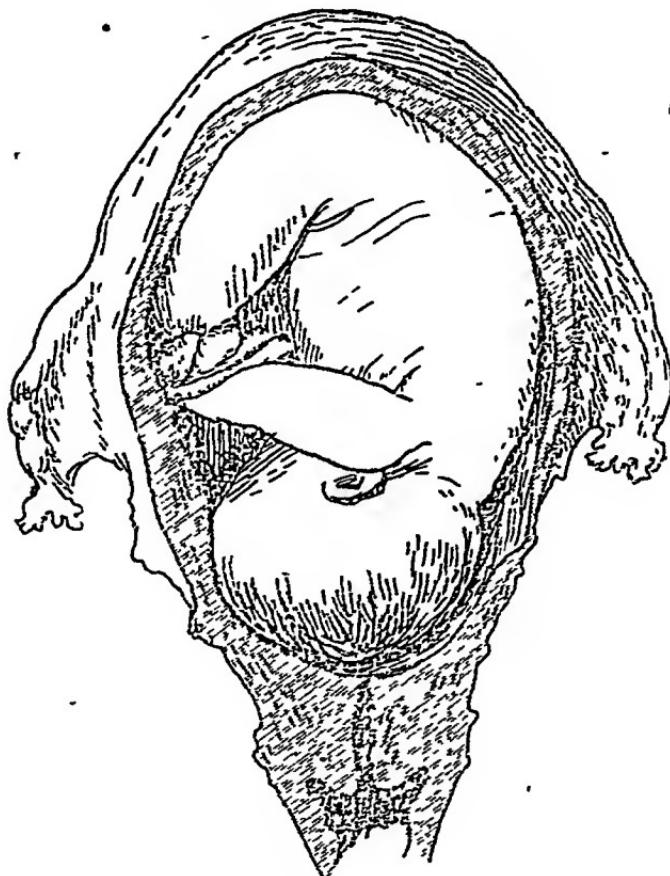


Fig. 186.
Vertex presentation.

royal route. It is therefore the camp follower and forms a part of the procession of the passenger. The watery membrane, the child and the placenta complete the group of passengers.

MECHANISM OF LABOUR

The expulsion of the child from the uterus is the labour. The cause of the pain lies in the uterus, for it wants to send away a snugly sleeping passenger who does not know how to move. The uterus has to use power first for clearing the passage and then for forcing out the passenger.

We have seen that the neck of the uterus is normally closed but for a small opening of the diameter of knitting needle. The sperm had found its way in through this door and after conception this opening was closed by a plug of mucus. This passage is now to open up for the exit of the child. What was only a very small aperture at one time, should now enlarge many times in order to let out the child. The uterus had grown with the growth of the child. Its muscles had increased by growth. Its neck had also thickened but remained in its normal position in the pelvic cavity. The passenger is in a watery bag. The uterus utilises this watery bag to make the cervix expand. It accomplishes this by trying to make the membranous bag to act like a conical wedge against the opening. The membrane containing liquor amnii is made to elongate and enter the approach of the opening. Then gradual but regulated pressure is applied by the uterus which pushes the head of the child on to the liquor amnii lying between it and the membranous bag. The membrane tends to become elongated like a thimble at the point of contact with the opening and ceases to follow the curvature of the head as it so long did. This cone of water expands with pressure and

PREGNANCY : CARE OF MOTHER AND CHILD

helps to expand the passage. One push is continued for sometime and then there is relaxation—the head recedes and ceases to press. Then again there is another push continued for sometime and then again a cessation of the force or relaxation. These pushes go on expanding the canal at the neck of the uterus or the passage. Nature takes time to thin out the wall of the canal. It cannot force open the entrance all at once. Therefore the pain of opening the passage continues for hours, coming and passing off. The uterus contracts in applying the force. The uterus is a peculiarly shaped bundle of muscles intended for special purpose. As in the other muscles, force is applied by contraction so in the uterus also there is that characteristic contraction. Contraction, application of force and feeling of pain on account of continual small expanding ruptures of the tissues of the neck of the uterus occur simultaneously Labour pain thus has periodicity and is synchronous with the contractions of the uterus.

The Stages Of Labour

Labour may be conveniently divided into three stages. First stage is from the beginning of true labour pains to the completion of cervical dilatation and consequent rupture of the membranes. The second stage is expulsion of the child outside. The third stage of labour is the expulsion of the placenta first from the uterus and then through the vaginal canal

STAGES OF LABOUR

In normal labour it takes about 12 to 16 hours for the cervix to dilate fully in case of primipara and about 6 to 8 hours in the case of multipara

The second stage of expulsion of child from the cervix to outside takes about two hours in case of primipara and about half an hour in case of multipara.

The third stage of expulsion of placenta takes about 15 to 30 minutes

MANAGEMENT OF NORMAL LABOUR

The First Stage

In labour the first thing to be ascertained is whether the pain is a true-labour pain or some other pain. Time of delivery is to be counted from the onset of the true labour pain. The true labour pain should be diagnosed. Labour is indicated by dull, irregular, aching and slow pain appearing over the sacrum and side of uterus. A characteristic about labour pain is its periodicity. It comes at intervals of fifteen to thirty minutes and as time passes, the period of respite gets shortened. The uterus becomes hard and gets contracted in its expulsive efforts. This is the one characteristic of the labour pain—this synchronism of the contraction of the uterus with the pain. The periodicity of pain may be normal or abnormal but if there is the simultaneousness of pain and contraction it should be regarded as labour pain. After sometime a reddish discharge “show” appears due to separation of membrane from the mouth of the cervix.

Constipation or accumulation of gas in the intestines of a pregnant woman may cause pain. It is relieved on purging by enema, whereas labour pain gets intenser after an enema.

MANAGEMENT OF NORMAL LABOUR

During the first stage of labour it should be borne in mind as also during the later stages that nature is to be helped in a natural way At this moment the uterus is trying to make the cervix expand and efforts should be directed towards making this easy by helping nature and removing obstruction

(1) Gravity helps nature's effort to open the cervix, so that during the first stage or the stage before the membrane has burst, she should be asked to stand or walk about Care should be taken not to exhaust her

(2) Obstructions from the passage should be removed by emptying the bladder and the rectum. She should be asked to pass urine every hour If she fails, a catheter should be passed

Rectum should be emptied by giving a dose of an ounce of castor oil Castor oil acts in three hours Castor oil should be followed up by an enema, so that there is an immediate cleaning and afterwards by the action of the castor oil there would be removal of debris from up also After such emptying rectum will easily yield to pressure a condition which is necessary

(3) The strength of the mother should be kept up. In primipara the labour pain may exceed normal time limit and extend up to 24 hours She should be given warm milk and fruit juice Normal solid diet should not be given after the true labour pain commences

(4) Keep her mind off her condition She may be sewing or reading Recitation of favourite pieces of

PREGNANCY : CARE OF MOTHER AND CHILD

song or the Gita or the Ramayana will soothe the mind and bring in helpful pose. No anxiety should be expressed by attendants nor any unpleasant subject should be touched. Nervous and garrulous women should not be allowed near her.

(5) Care should be taken that the interval between the pains be utilised for relaxation and recoulement for the next attack of pain.

The Second Stage

When the dilatation is completed, the membrane which has pressure on one side of it on large surface, bursts. When the water bag bursts the mother responds to a reflex act of putting pressure. So long it was the contractile force of the uterus which was expanding the cervix. But now with full dilatation that force is aided by the reflex action of the mother consisting of application of force as in defæcation. After the bursting of water bag, she should be put to bed.

At this time others should be engaged in keeping some ten seers of water boiling over a fire, but outside and not in the room itself. Three pieces of strong cotton cord should now be made sterile by boiling in water for sometime and then set aside in the boiling pan. These should not be removed from the vessel in which they have been boiled. The vessel should be kept covered till required for use. The pair of scissors

MANAGEMENT OF NORMAL LABOUR

should be boiled with the pieces of string and kept sterilised.

The head shapes or moulds itself to suit the pelvic cavity and after emerging out of it passes through the vaginal canal. The head presses against and pains the perineum in making it expand.

The mother should lie down on her back. She should not be asked to take a position on hands and knees facing down as is the custom in some places. This position ensures putting of greater pressure during forcing but the passage may be ruptured by excessive pressure.

(1) Proper thing for her would be to grasp something for putting pressure. A piece of cloth twisted into a rope and fixed against a post beyond the head may be used for grasping for putting force. At the same time the feet may be allowed to press against the turned up ledge of the cot. If there is no ledge some such obstruction may be arranged for against which the feet may rest and press. When the head of the child becomes visible in the passage through the vulva, no pressure should be put. There is the risk of rupture of the walls of the passage by putting of pressure at this stage. On the contrary, the mother should be directed to breathe quickly through the mouth so that the tendency to put pressure may be checked.

(2) An enema should be given. If the stage lasts long both enema and catheter may be given every two hours.

PREGNANCY : CARE OF MOTHER AND CHILD

(3) There should be no feeding during the second stage. Just a spoonful of milk may be given for sipping at times

(4) The attendant should direct her attention at this moment to gently manipulate the out coming head of the child so that the greatest diameter may not press against the perineum

The dangers of unnecessary interference and consequent risk to the life of mother and child have

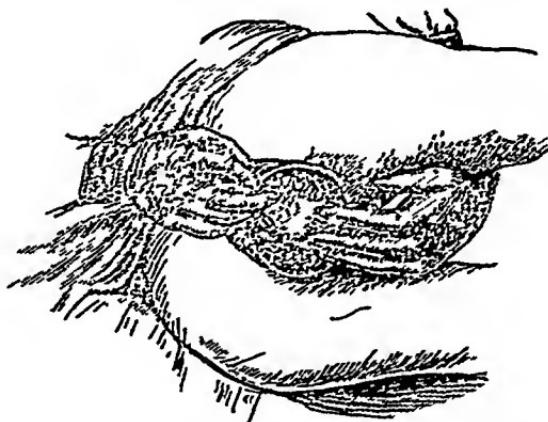


Fig 187.
The out coming head ; how to save the perineum

been fully explained. They should be remembered at every stage and every moment during labour. There should be no attempt to lubricate the passages, as nature herself provides sufficient lubrication

(5) When the child's head has emerged out examine the neck to see if the umbilical cord is wound round it. If the cord forms a loop round the neck, unloop it by pulling the cord a little and pass it over the head or enlarge the loop and push it below the

MANAGEMENT OF NORMAL LABOUR

shoulder so that the child can come through the loop. While the head has just come out, the attendant should wash the eyes of the child with boric lotion. Thousands get blind for neglect at this stage. So-called born-blind persons are not usually born blind but some sepsis occurs to the eyes at the time of birth and the child's eyes suppurate and get blinded.

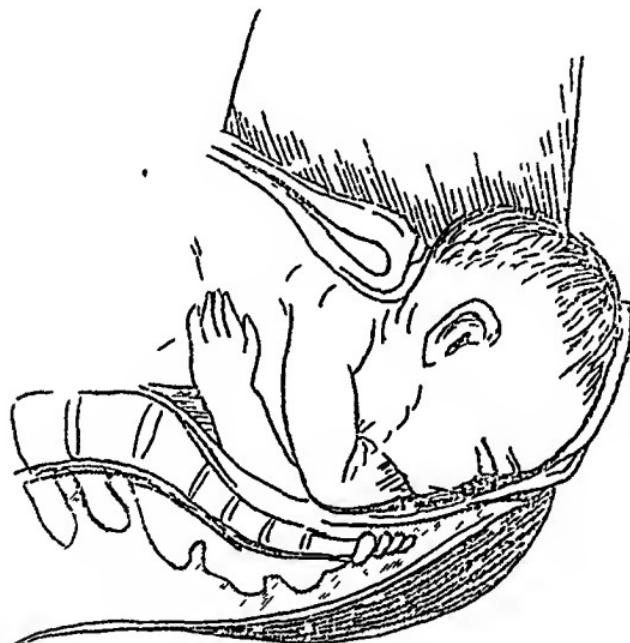


Fig 128
The emerging head

The first thing on the appearance of head would be for the attendant to take boric lotion and cleanse the eyes. A few drops should be put in each eye after cleaning of the surface area. One per cent solution of silver nitrate is a better substitute of which one or two drops may be put in each eye.

PREGNANCY : CARE OF MOTHER AND CHILD

When the head has come out, the rest of the body comes out automatically and has to be received. The soiled clothing and mattress if any is used should be removed from the room after delivery. The cloths may be boiled with plenty of water containing washing soda and beaten free from all dirt and smell and reboiled, washed and dried. The blood and other

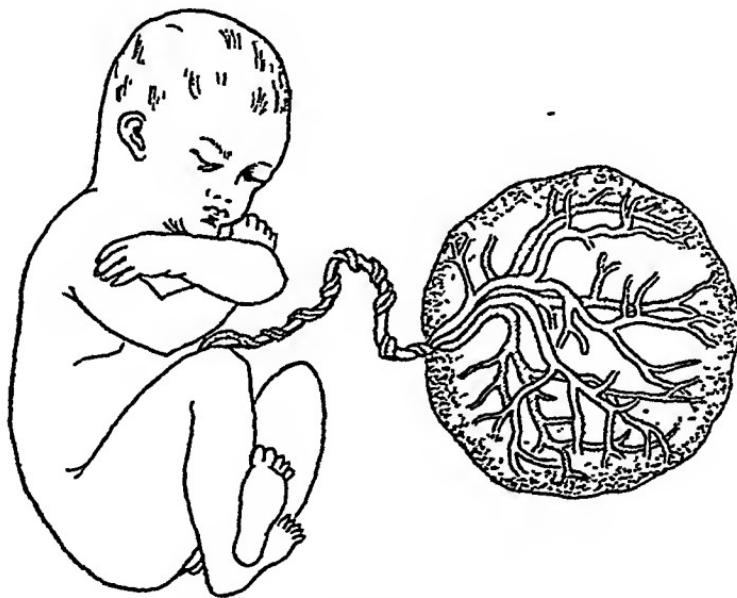


Fig. 189.
The foetus with placenta and umbilical cord.

discharges and the placenta etc. should be placed in an earthen-ware vessel covered up and removed from the room to be buried under earth.

Precaution should be taken at every stage that no contaminated substances or hands or rags may come in touch with the parts and the child. This is the only way to prevent puerperal fever and tetanus.

MANAGEMENT OF NORMAL LABOUR

Now about the child The child should be taken up on a piece of soft cloth The throbbing of the umbilical cord ceases after a while in about 8 or 10 minutes. So long as the cord is throbbing mother's blood is circulating into the child If the cord is cut too early, while yet it is throbbing, it will have the effect of depriving the child of some quantity of the mother's blood which it should have received

For cutting the cord the pair of scissors kept under boiled water should be taken up and also the threads The umbilical cord should be taken up about two inches away from the child's navel and tied very firmly. There should be another tying up just where the cord emerges from the vagina Before tying at the last place the cord should be gently pulled and as much of it as was remaining loosely inside should be drawn out

The Third Stage

Now the expulsion of the placenta has to be attended to At this stage the bleeding from the uterus should be stopped

The attendant should put a hand over the abdomen and there get hold of the top of uterus It should be now firmly kneaded which serves to stop bleeding Care should be taken that the kneading is applied at the fundus or the top of the uterus otherwise mischief may occur by contraction on the middle of the uterus and consequent locking of the placenta Kneading is

PREGNANCY : CARE OF MOTHER AND CHILD

to be continued till the placenta comes out itself. Placenta should never be pulled out. The progress of the placenta towards expulsion may be judged by the position of the ligature on the cord lying outside the vulva. The length of the cord between the vulva and the ligature increases as the placenta travels down.

The mother should be cleaned of the blood and other discharges. The parts should be washed well with warm water. The attendants should see at this time that nothing dirty and of the nature of refuse is left in the room. All spoiled water should be taken up and removed. In a few minutes after delivery the mother and the babe should be comfortably laid in bed, covered with a light cover. There should be no smell of blood and dirt in the room. Everything about it should be made scrupulously clean. All washings or sweepings should be carefully removed. Sweeping, where necessary should be gentle so that no dust may rise and pollute the air. Her abdomen should be tightly wrapped up so that the uterus may not roll about. A long piece of bandage about 36 inches wide and 5ft. long should be double folded to 18 inches wide. It should be taken up and rolled tightly round the abdomen of the mother. Leave the upper fold to be fastened with the help of stitches. Neglect to tightly bandage the abdomen at this stage may give rise to flabby abdomen which is very reasonably associated subsequently with bad digestion and diarrhoea. If the bandage is soiled, it should be changed for a fresh one.

DELAYED LABOUR

In a case of delayed labour the very first thing to be done is to ascertain the stage of labour, as to whether she is in the first, second or third stage of labour. Each stage may have different causes for the same symptom and the management will largely depend upon the stage.

After having ascertained the stage, the causes of delay at that stage has got to be found out and then a diagnosis is to be made as to what is definitely wrong. Management will then follow as a matter of course.

Causes of Delay in First Stage

Power — The delay may be due to deficiency in power or deficient contractile force of the uterus. This again may be primary or secondary. Technically deficient force of uterine contraction is called uterine inertia. Primary uterine inertia is that which exists from the beginning. The patient does not get sufficient pain at any time. When there is a cessation or diminution of pain sometime after having strong labour pains, the case is one of secondary uterine inertia.

Passage — In delayed labour in the first stage, the cause of delay may lie with the passage. The cervix may not dilate in spite of strong labour pains.

PREGNANCY : CARE OF MOTHER AND CHILD

The cervix may be too fibrous or too rigid to yield or it may not dilate properly due to premature rupture of the membranes

Passenger :— The passenger is the first van guard or the bag of membrane containing liquor amnii. The membrane may be too tough and may not have burst even when the dilatation is complete.

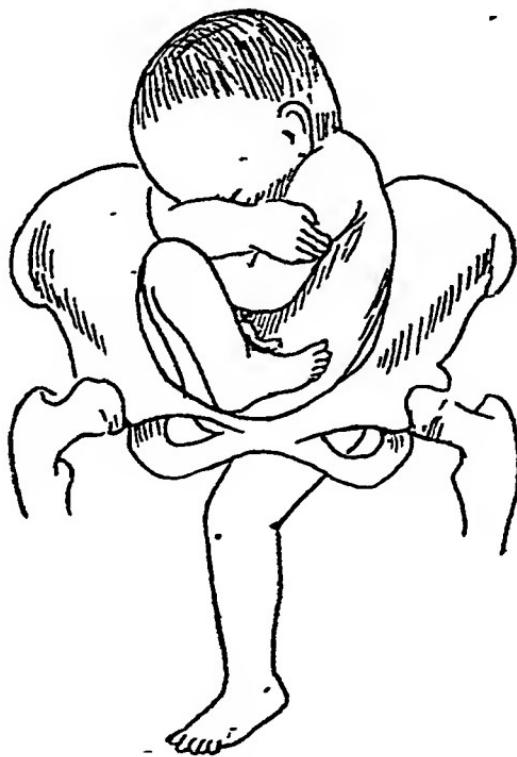


Fig 140. Breech presentation.

Delay in Second Stage of Labour

If the first stage is over, and there has been full dilatation of the cervix yet the child does not get born, it is delayed within..

DELAYED LABOUR

Power:—The fault may lie with the power and there may be primary or secondary uterine inertia. Or the fault may rest with deficient abdominal contraction, a contraction which normally comes into play with the commencement of the second stage.

Passage:—The passage may be at fault. Here in



Fig. 141. Delayed transverse presentation.

the second stage the child has to emerge out through the pelvic cavity and the cavity may be too small.

Passenger—The passenger itself may be responsible for the delay in the second stage (1) The head of the child may be too big for the pelvic cavity to pass through. (2) There may be defective

PREGNANCY : CARE OF MOTHER AND CHILD

presentation in which instead of the vertex of the child appearing through the pelvic cavity, the face, the back, the breech or the brow may be presented, or twins may be coming out.

Delay in the Third Stage

The third stage is concerned with the placenta. There may be delay in delivery of the placenta. The causes may lie with

Power.—There may be uterine inertia

Passage :—The uterus having delivered the child cannot reasonably keep the placenta in it. It may be that the attendants while attempting to contract the uterus may have kneaded it wrongly so that the middle has contracted and entrapped the placenta.

Passenger.—The placenta itself may be the cause of delays (1) The placenta may be abnormally adherent to the uterus. (2) The placenta may be very thin and papery in which case it crumples up with the contraction of the uterus and therefore cannot be separated. (3) The placenta may be retained in vaginal canal after having separated itself from and come out of the uterus.

DIAGNOSIS OF THE CAUSES OF DELAYED LABOUR AND ITS MANAGEMENT

First Stage

The contraction of the uterus or absence of it can be observed Whether there was previous strong pain may be gathered from the history so that it is established whether the uterine inertia is primary or secondary

If the inertia is primary and the pains are not coming strong enough, then it would be worthwhile to wait. The patient should be asked to take rest and be given hot milk She should be treated on the general lines There should be no anxiety so long as the membrane does not burst

If it is a case of secondary inertia then it should be concluded that there is some obstruction somewhere which nature has not been able to overcome and in its attempts has become exhausted, the secondary inertia being a sign of exhaustion The obstruction may be at the cervix which is too rigid to yield In that case steps should be taken to make the cervix softened by slow long continued douching of warm water If this will not succeed then the case is for an expert to handle

If the delay is due to the tough membrane, if there has been full dilatation and yet the membrane

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has not burst, then after taking proper aseptic precautions the village doctor may push the ends of a pair of scissors in and puncture a hole and widen it by tearing by separating the blades.

If the delay is due to premature rupture of the membrane and the cervix is not dilated, an experienced doctor should be called in. Where one is not available the village doctor himself may after taking proper aseptic precautions try to dilate the cervix. A dilator in the shape of a rubber bag is used in which water is pumped after it is placed in the position of the membrane. The slow continued pressure of the rubber bag imitates nature. But such an appliance is not available in villages. The village doctor should after thorough aseptic precautions introduce his fingers and rotate them with dilatory pressure. This may take a long time but ultimately dilate the cervix so as to let the head to pass. Manipulation should be done only during the interval of pain.

Second Stage

The Power :—In the second stage as in the first the deficiency of power may be found out by observation.

If the case is one of primary inertia then uterine contraction should be induced by quinine.. 10 grains should be given in one dose followed up by another similar dose if the contraction has not come in 2 hours If the inertia is a secondary one, nothing should be

CAUSES OF DELAYED LABOUR : MANAGEMENT

done to increase the contraction Nature being exhausted artificial stimulation will only do harm In such a case try to explore the cause of obstruction which must be there and remove the obstruction The pelvis may be contracted or there may be malpresentation. Try to ascertain where the trouble is.

Delay in the second stage may be due to deficiency of abdominal contraction It may be that the perineum is so sensitive that the mother feels excruciating pain in applying force If this is established a few drops of chloroform inhalation by the patient will act wonderfully well. As the patient becomes insensible the reflex contraction is put on with full force and the emergency is got over

In order to guard against overdosing the patient with chloroform 10 to 12 drops of it may be placed in a small glass or cup over a little cotton The patient is to hold this glass herself and inhale As she approaches insensibility, the glass gets off her grip and falls off, thus preventing any chance of overdosing.

The Passage —The pelvis may be contracted The village doctor may push the head with the uterus against the pelvis and find out if the pelvic cavity is too small to let the child's head come out If the pelvis is found to be slightly contracted then one expedience may be tried

The patient lies down so that her feet hang over the edge of the bed which must be raised too In this position the pelvis presents widest opening to the

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head and if the misfitting is slight, the child's head may pass through. If this fails forceps may be successfully tried

Failing this, surgical interference would be necessary. The child may be taken out by cutting open the pelvic bone or by opening the abdomen.

The Passenger :—The head may be too big for pelvis which may be a normal one. The case may be one of hydrocephalus in which the child has water in the head and which is much too bigger than a normal head. The child may be abnormally presented in which case instead of the vertex some other part of the child's body occupies the lowest position. In some of these malpresentations something may be done by manipulation, if the village doctor acquires some experience. Most other cases including those where the head is large, surgical interference becomes necessary. Fortunately, the percentage of cases where interference is necessary is very small. We shall come to this while dealing with presentations. Where the passenger is at fault, an expert should be called in or the patient taken to him whichever is possible.

The third Stage of Labour

The Power :—Uterus needs kneading to contract and expel the placenta. If there is delay and the power is at fault, then the fundus of the uterus should be kneaded. Usually this will succeed.

CAUSES OF DELAYED LABOUR MANAGEMENT

The Passage —It may happen that owing to faulty kneading the middle of the uterus has contracted. This is technically known as hour-glass contraction. In such case the uterus should be allowed to be relaxed and then properly kneaded.

The Passenger —The placenta may not come out due to some defect in it, or it may not have separated from the uterus as it should. It is to be ascertained in the case of retained placenta whether the retention is within the uterus or in the vaginal canal. By feeling the uterus it may be found out whether there is the placenta in it or not. After delivery the uterus remains hard and globular with the placenta in it and below the level of the navel. But when the placenta is expelled the uterus becomes soft and elongated and reaches the umbilicus.

If the placenta is retained in the uterus then kneading will succeed usually in separating it. It may be that the placenta has left the uterus and is in the vaginal canal. This can be ascertained from the outside if the cord had been tied just beyond the vulva as described. In such case if the placenta has left the uterus, then distance of the knot in the cord from the vulva will increase. When it is ascertained that the placenta is in the canal, then it should be pressed out by manually pressing the uterus slightly downwards and backwards. This will serve to expel the placenta from the canal.

If however the placenta is in the uterus and will not come out by repeated kneading, then if there is no

bleeding, we may wait up to two to four hours. In the meantime the uterus should be squeezed to facilitate expulsion. But if there is bleeding and waiting is not desirable, then after taking aseptic precautions the placenta should be dislodged from its position manually and left there to be expelled out normally. Failing this, it should be slowly manually withdrawn.

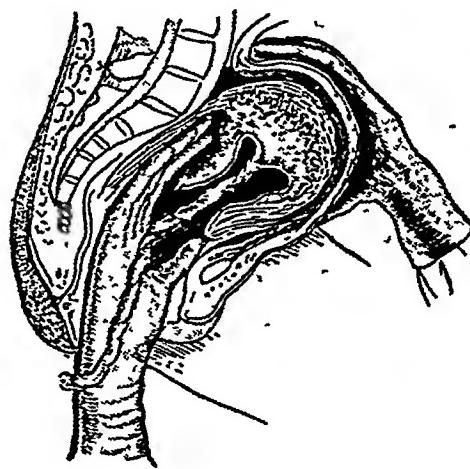


Fig. 142.
Manual removal of adherent placenta.

Bleeding Before Discharge of the Placenta.—The patient should be laid on her back and the portion of the abdomen below the navel should be gripped by the palms of both hands and kneaded as in churning. After kneading or massaging the fundus of uterus which was soft becomes hard, and on it pressure is put. It will help to throw off the placenta and stop bleeding along with it. If the first attempt is not

BLEEDING BEFORE AND AFTER PLACENTA-DELIVERY

successful and the uterus becomes soft without expelling placenta, the massaging should be repeated till the uterus becomes hard and then a squeeze is to be given for expelling placenta Bleeding stops by keeping the fundus of the uterus squeezed.

Bleeding after Expulsion of the Placenta .—The same procedure as for arresting bleeding before

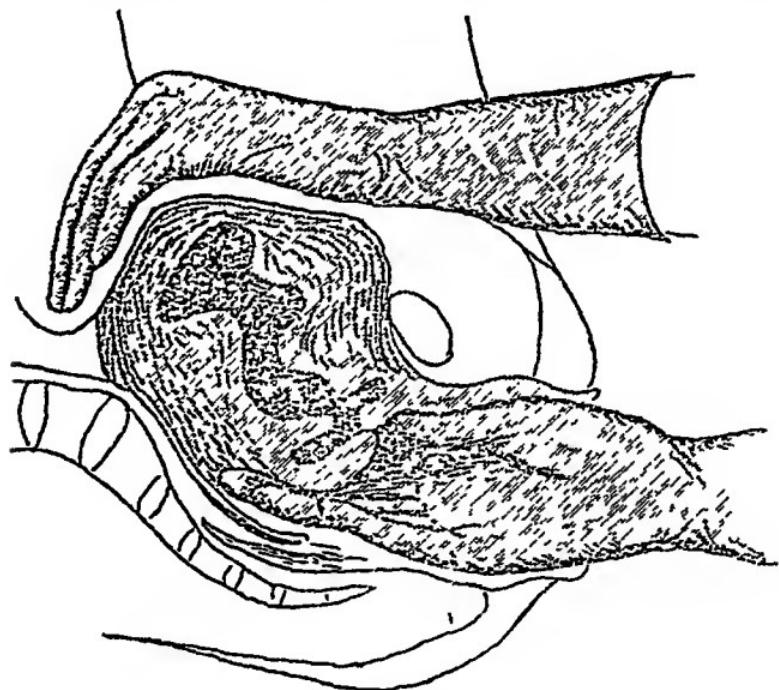


Fig 143.

Bimanual compression of uterus to check bleeding

expulsion of placenta is to be adopted If there is profuse bleeding for 8 or 10 minutes the result may be very serious The extremities get cold, difficulty of breathing and restlessness commence and if bleeding is not stopped death takes place without delay

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The bladder should be relieved by catheter and parts washed. If massaging on the uterus does not harden it and if bleeding continues then the graver step of pushing the hand within the uterus should be taken. The uterus should be pressed between a hand placed on the abdomen and the other placed inside. Sterile gauge then may be packed inside. The abdomen is

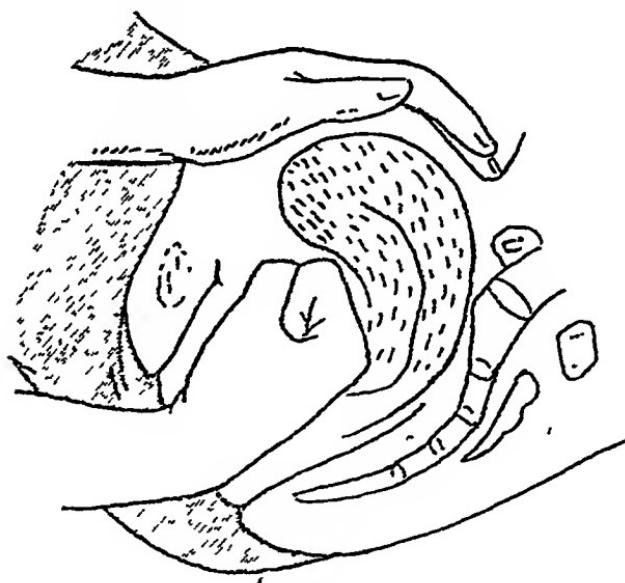


Fig. 144

Bimanual compression of uterus to check bleeding.

tightly bound by a rubber tube wrapped with cloth and the patient put to bed.

Bleeding induces thirst and the mother should be given as much water as she can take in, in small quantities at a time. Too much intake of water at a time may induce vomiting. Injection of saline is

PRESENTATIONS

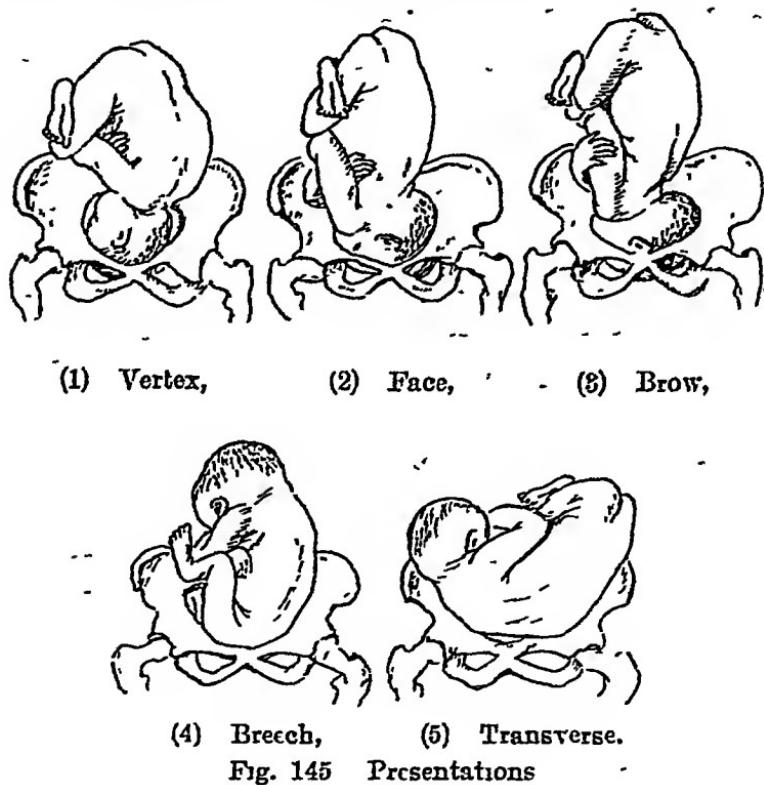
necessary to compensate temporarily for large losses of blood.

Laceration of the Perineum —It is one of the commonest accidents in midwifery This laceration may be complete or partial. Laceration should be sutured immediately after the occurrence The wound should be healed by application of neem oil or boric ointment

Presentations

The foetus in the uterus is more or less free to move The shape of the uterus which is ovoid like an egg, has the larger diameter at fundus and smaller diameter at cervix The foetus naturally accommodates itself to the shape of the uterus If the head and the breech are regarded as the two poles of the foetus, then the larger diameter of these poles is the one at the breech This therefore would naturally fit with the fundus or upper portion of the uterus The head has the smaller diameter and should correspond with the cervix of the uterus The foetus while growing has more than ample space in the uterus and the foetus may take any position although the heaviness of the head will tend towards keeping the head downwards As the foetus grows there is less and less free space and if the breech were near the neck of uterus, the tendency for it would be to try to seek more space and thereby naturally rotate towards forcing the breech to the fundus and the head towards the neck of uterus This is the normal position.

When the child is about to be delivered, the normal position is the vertex of the child pushing at the centre of the cervix. This position of presentation is called **vertex presentation**. There may be slight variation of the position of the head from the normal position and the presentations are named face or brow.



(1) Vertex, (2) Face, (3) Brow,
(4) Breech, (5) Transverse.

Fig. 145 Presentations

according to what is presented. So we find here three presentations with the head downwards :

- (1) Vertex presentation
- (2) Face presentation
- (3) Brow presentation

PRESENTATIONS

The normal presentation in which the vertex is presented is found in about 97 per cent cases. Face and brow are rare being only half per cent cases between the two. When the other pole or the breech is presented it is called breech presentation. About 3 per cent cases are said to have breech presentation. The third alternative position is the back pressing against the cervix. This is called transverse presentation. About one in three hundred cases may show transverse presentation. In both breech and transverse presentations it is the head that comes after. These cases require longer time for delivery. In breech presentation there is no great danger for the mother, but the delayed delivery and consequent prolonged pressures to which the child may be subjected to, may exhaust the child and it may die during delivery.

ASPHYXIA OF THE NEW-BORN

The child may get exhausted during labour. While in the vaginal canal under abnormal conditions it may have gasped and suck in some fluid thus closing the air passages Under these and similar circumstances the child does not cry out the cry of birth.

When a child does not cry, it is a sign that it is not breathing and emergent steps are to be taken to revive it. Stoppage of breathing or asphyxia is divided into two classes One in which the child is white, and is called white asphyxia and the other in which the child is blue and is called blue asphyxia When breathing stops there is blue asphyxia and as time passes the blue gives place to whiteness. White asphyxia is therefore more serious than blue asphyxia. Management varies with the nature of asphyxia and a treatment which may bring a case of blue asphyxia to life may kill a case of white asphyxia.

The child is to be separated. The cord is to be tied at once. It won't matter even if the cord is still throbbing Then follow the following procedure :

Put the child in warm water. Examine the throat and if there is mucus draw it out with the help of your little finger. This may be conveniently done by holding the child by the legs with head down as shown in the sketch. A glass tube with a bulb

ASPHYXIA OF THE NEW-BORN

in the middle, bent and round at the end may be used for sucking in the mucus from the mouth. The bulb in the middle retains the mucus which cannot run on to the operator's mouth.

It should be noted that artificial respiration should never be attempted without clearing the throat. For

at the attempt at respiration the child will then draw in the mucus in the air passages and get choked.

If it is a case of white asphyxia, keep the child in warm water and continue artificial respiration till it turns blue. If it is a case of blue, or when white improves to blue, put the child alternately in hot and cold water. The temperature of water should be just warm. Care should be taken that water too hot for the delicate skin of the child is not used.

Fig 146 Removal of mucus from the throat



Alternate heat and cold application brings on reflex action and the child cries or attempts to gasp. Reflex action may also be brought about by splashing cold water on the face or striking with a cold wet towel on the buttocks.

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Air may be blown into the child's mouth by opening it, then covering it with a thin piece of cloth and blowing through.

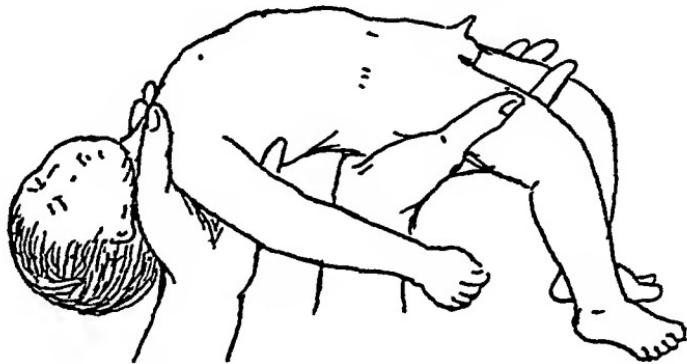


Fig. 147 Chest expanded for inspiration.

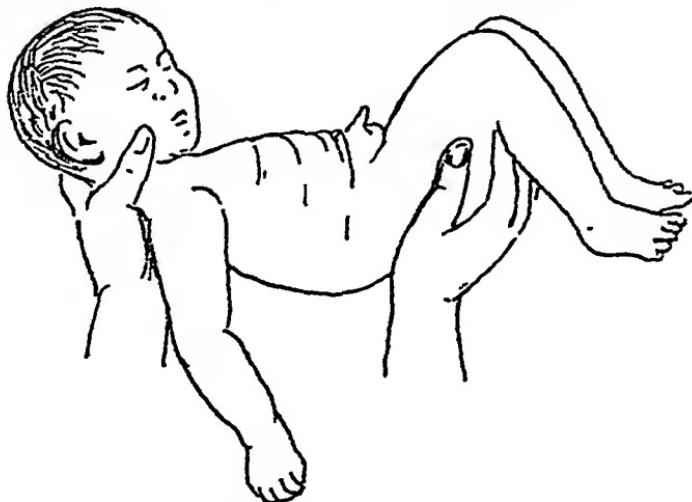


Fig. 148 Held in position for compression.

If all these fail, artificial respiration should be commenced

During artificial respiration the child should be often put in warm water to keep up its temperature.

ASPHYXIA : ARTIFICIAL RESPIRATION

Where the child is apparently dead perseverance to continue artificial respiration not unoften is rewarded with success. Cases have been known where recovery took place after attempt of an hour and a half. No case of asphyxia should be taken for dead till a very long time elapses after apparent death and in the meantime artificial respiration is to continue.

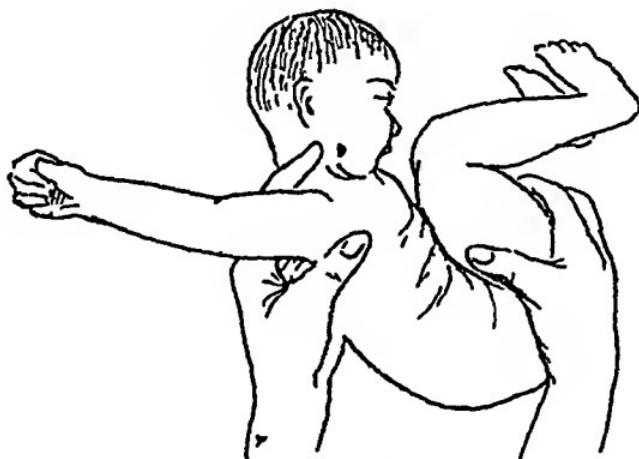


Fig. 149. Chest compressed for expiration

Artificial Respiration —It consists of alternate expansion and compression of the chest. The child is taken upon both the hands and laid flat over them. For expansion or inspiration of air the hands are allowed to hang down and legs to drop giving a convex shape to the chest Fig. 147. Then the head and legs are straightened Fig. 148 and bent down giving a concave shape to the chest Fig. 149. In this position the air is pressed out causing vacuum. This is done 10 to 12 times per minute. After a minute's

PREGNANCY : CARE OF MOTHER AND CHILD

trial the child should be immersed in hot water, taken out, wiped and again artificial respiration continued. Immersion in warm water is necessary in order to keep up the temperature

After Delivery Care of the Mother

After delivery several things require immediate and careful attention both for the mother and the child. The bleeding from the uterus should be stopped, the child should be attended to and the umbilical cord should be cut. Here the dhai would require a clever assistant or two to attend to the child and mother. The attendant should put a hand over the abdomen and there get hold of the top of uterus in position and then tightly bandage the abdomen.

Rest.—The mother should remain quietly in bed. She should remain in bed for several days. The sterilised pad over the genitals should be frequently changed and the external parts as often washed with warm neem water. In six or seven hours she may pass urine. If she will not pass urine within this time then a large towel folded several times should be put in hot water and wrung out. This should be put over the pubic region and over the genitals. This treatment will induce urination. The bowels of the mother should be moved a day after child birth. If there is costiveness then a mild purgative of myrobalans should be given.

AFTER DELIVERY CARE OF THE MOTHER

Diet.—For the first two or three days the mother should be kept upon light diet, preferably on milk or milk and sago. On the third day rice or ata should be given, whatever is usual for her, in a small measure, supplemented by milk and sago. After the third day the quantity of food may be increased. It should always be remembered that any hard or undigestible food during confinement may cause diarrhoea. Disease of the digestive organs after pregnancy makes many a mother life-long invalid. So, every care should be taken to give the lightest food to the nursing mother, milk being the principal item. If milk is not tolerated, dahi, chhana or other milk products may be given. Plenty of water should be given at this stage. Some have a superstitious fear for water at this stage. Sometimes the mother is subjected to great thirst for fear of injuring her by giving her plenty of water to drink. This is most unscientific and wrong. Water can only do good and shortage of water is likely to do incalculable harm. The toxins that are produced require to be washed away by plenty of water. The system suffers a great withdrawal of blood during parturition and nature wants to recoup this loss with the help of copious water. The demand should be satisfied. The water may be cold or tepid according to taste.

Water:—Drinking water should preferably be boiled before use. The state of health after delivery remains delicate and during this delicate stage any infectious disease may get hold of the body. Water

PREGNANCY : CARE OF MOTHER AND CHILD

may contain injurious bacteria. By boiling the bacteria get killed and therefore the risk of infection from one direction is avoided.

Light and Air:—These are two essentials of life. Unfortunately it is the custom to shut out a free flow of both these during the puerperal period. This evil custom should be broken through and the mother allowed to receive plenty of direct sunlight and air. She may not be exposed to mid-day sun. But when the heat is mild, sun rays will do immense good. The discharges that continue to occur during this period attract bacteria and sunlight kills them. Similarly fresh air should be allowed to enter the room and there should be breeze playing through the room. Instead of this we find every precaution taken to shut out all access of light and air from the confinement room and to add to it, a fire is kept continually smouldering in the room, winter or summer whatever be the season. This is against all rules of sanitation. Want of sunlight and fresh air makes both the mother and child unhealthy and this ill health may last through the rest of life.

Application of Heat:—Rags made into small balls and heated over a charcoal fire and applied to the abdominal regions of the mother give relief. This should be done. But the fire should be brought within the room only when necessary. A burning smoking fire within a closed room is very deleterious to health.

AFTER DELIVERY CARE OF THE MOTHER

Untouchability :—The mother is regarded as untouchable and the child and the room also. This would have a meaning if it is to protect the mother and child from contagion from carriers. But the object is far from it. The untouchability causes untold suffering on the mother and child from sanitary point of view and also from the point of view of comfort. Only such material is supplied to the mother in confinement which can be thrown off. Little regard can therefore be paid to the comfort of the mother and the mother is a patient in delicate health for a fortnight after delivery. This heartless and foolish custom should be broken and the mother and child be given the best care possible during this period. They should not be treated as untouchables. The proper outlook is to regard them as patients after a surgical operation.

The Discharges —There is continual discharge from the private parts for a few days after delivery. It consists at first of blood with white corpuscles in excess, then blood and serum and finally serum alone. Blood ceases by the 5th or 6th day. The discharges are to be absorbed in a pad put against the parts. The pad is to be kept in position by a triangular bandage which every woman knows how to suspend. Care should be taken to wash the parts with antiseptic lotion every time the mother passes urine or stool. A cheap and dependable antiseptic lotion is made by boiling neem leaves in water. The pad should be of clean cloth, kept boiled and dried previously. It

PREGNANCY : CARE OF MOTHER AND CHILD

should be changed as often as it gets soaked with discharges. Where however these must be reused, they should be thoroughly boiled in soda, washed and dried in the sun.

Attendant.—A sick room attendant is most necessary at least during the first fortnight when the mother is unable to take care of herself and the baby. Generally people refuse to render such services for money. Those only who are regarded as outcastes by the society and those in whom the sanitary sense is least developed will take up such a profession. The result is that the mother and baby are entrusted in the hands of one who is not expected to observe the sanitary rules. Members of the family should take up this nursing work. The observance of untouchability is however, a great bar to treating the mother and child in a rational way.

Complications After Delivery

Bleeding after Delivery:—In normal cases the mother has to change the pad placed before the private parts for absorption of discharges only four or five times daily for the first three days. If the pad gets saturated oftner, if the pad gets soaked all on a sudden, it will indicate that abnormal discharge is taking place.

There may be several reasons for this excessive bleeding. There may have been too much moving about. The uterus may have contained bits of the

placenta unexpelled Experienced dhais make sure that the entire placenta has come out at time of delivery. But clots of blood left in the uterus at the time of delivery may also cause the trouble Another reason for bleeding may be that the involution or return of the uterus to previous condition was less than what should have been normally. Bleeding may be caused by exhaustion due to prolonged labour or to general ill health during pregnancy The laceration of the perineum may also be a cause for bleeding

Excessive bleeding must be stopped, otherwise loss of blood will soon affect the mother adversely and may cause sepsis or death by emaciation. This condition is preventable General health of the expectant mother should be a matter of grave concern Neglect in the beginning is often fraught with mischief of this nature Tuberculous patients die on account of being exhausted at this stage It should be remembered that careful feeding after birth serves to maintain strength The placenta in entire or bits of clot in the uterus should have been expelled by taking care at the time of delivery by friction and squeezing as indicated Placenta should be examined carefully after expulsion at the time of delivery and defects noted

Movements should be avoided for 2 or 3 days after delivery If it is suspected that there are clots within the uterus, then friction, massage as already indicated should be applied Massage excites the uterus to contract On contraction if the uterus is pressed a

PREGNANCY : CARE OF MOTHER AND CHILD

little, hard thin clots are likely to be expelled. Too great pressure may injure the uterus and cause fresh trouble by way of its inflammation. The pressure therefore should be given discreetly. If the perineum is injured and is bleeding the wound should be properly dressed. Care during delivery is an essential condition for preventing future troubles of this nature.

When due to exhaustion brought about by excessive bleeding the patient experiences heart trouble, then treatment should be conducted as described under anæmia. Arjun as heart tonic should be given, also makaradhwaja. Exposure to cold may also bring in trouble of the above nature. The mother should be properly protected against cold by being provided with sufficient warm clothing according to the season and climate.

Puerperal Fever

After child birth many have slight fever for a few days. This is nothing serious and does not last more than 3 or 4 days. Septic fever however commences after the third or fourth day of delivery and is a very serious matter. Microbic infection is responsible for this state. Introduction of unclean hands or instruments into the passage, use of non-sterile plugs or pads, leaving of clots within the uterus or failure to wash the genitals with neem water every time the pad is taken off, all may cause infection and thence sepsis with puerperal or after-delivery fever.

There are purulent discharges, high rise of temperature, rapid pulse, general malaise with rigors and intense pain in the lower abdomen

The fever is preventable and should be prevented by attending to details of sanitation and asepsis indicated at various stages during delivery. If the general health is good, much mischief is automatically prevented. Therefore health should not be allowed to run down before and after delivery. Many usages about dealing with post partum condition lead to feebleness of the patient. Plenty of water may not have been given. Plenty of liquid diet in the form of milk may not have been given. The patient may have been exposed to foul suffocating air or may not have had the life-giving and disinfecting exposure to sun's rays or she may have been troubled with exhausting talks. The action of skin may have been dormant on account of want of massage. Injudicious feeding may have brought on diarrhoea and thence exhaustion. All these and similar causes for running down of health should be sought for and prevented from the beginning.

Even after the onset of fever if the health is good nothing serious may happen. But if the health is run-down it becomes a very grave matter. The fever should be discovered early for early treatment may prevent dangerous development.

In cases of early discovery the patient should have a good purge by a full dose of castor oil or magnesium sulphate. The dose should be determined

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by the condition of strength of the patient. Purgation will in most cases wash the toxins out of the body. Plenty of water should be given for drink. The condition of perineum should be attended to and if foul discharges are coming, the interior should be daily washed out with tepid neem water. Calomel in fractional doses should be given. Headache should be reduced by cooling application. The head should be washed and water allowed to flow on for sometime over the head and neck. The patient should be induced to sleep. Cleaning of the bowels, application of cold and securing necessary comfort will generally induce sleep and sleep is a great recuperator a high efficient medicine—more efficient than many doses of drugs in this and many other cases. If the abdomen is painful, apply hot poultice lightly. The strength of the patient should be maintained.

If the case comes late then there may not be found an opportunity of giving purgatives on account of exhausted condition. Calomel in fractional doses should be given. Symptoms should be treated as they arise as in other septic fevers.

Inflammation of the Breasts :—Sometimes failure to relieve the flow of milk from the breasts causes inflammation. Infection may travel through unclean nipples and cause trouble. Hot water fomentation or boric compress should be applied and all accumulated milk squeezed out by pressure or sucked out by cupping. Washing of the breasts with hot water in which neem leaves have been boiled, is good for

AFTER DELIVERY CARE OF THE CHILD

reducing inflammation. Compress of hot moist pad should be placed on the breasts and covered with plantain leaves to prevent evaporation and the whole bandaged. This will very often meet the case. Emollients such as cream, cocoanut oil should be rubbed in to soften the skin. It is well to administer a full dose of magnesium sulphate to clear the bowels.

After Delivery Care of the Child

Now about the child. The child should be taken up on a piece of soft cloth. The throbbing of the umbilical cord ceases after a while, it is then time to tie the cord and cut it off. For this purpose the pair of scissors kept under boiled water should be taken up and also the threads. The umbilical cord should be taken up about 2 inches away from the child's navel and tied very firmly. Two inches away from this there should be another tying up. The sterilised threads being used for the purpose.

Cutting the Cord — The cord should then be cut in between the two tyings with the help of the sterile scissors. As an additional precaution the scissors and the threads may have a dip in a solution of tincture iodine. Neglect to take the above precaution about sterilising scissors and threads has been the cause of numerous deaths of children through infection of tetanus. Tetanus is a disease of ignorance, carelessness and neglect. There can be no tetanus where antiseptic precautions are taken at every

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step. The navel should be dressed. Some people wait till the discharge of the placenta before they cut the cord. This is cruel to the child which has to be kept exposed all the time. The cord is to be cut as soon as throbbing ceases, no matter if the placenta is discharged or not.

The Bath :— After the cord is cut, the child is to be taken up for a bath. The child is provided with a natural waxy coat. It has to live in water in the womb in order that the skin may not be injured by the long periods of contact with water in the uterus, nature has provided a waxy coating. After delivery, there is no further necessity for this waxy coat and the child should be cleaned off this coat. This waxy coat cannot be taken off by soap and water. It has to be dissolved off by oil. Mustard oil is not good for this purpose. Mustard oil has a pungency or irritating effect and is likely to injure the tender skin of the new born babe. Cocoanut oil or til oil is more suitable. The oil should be heated over a fire for sterilisation and cooled before use. The whole body particularly the joints and folds where the wax is heavily laid should be oiled and rubbed gently but thoroughly with a piece of soft cloth dipped in oil. This operation is not to be conducted in a current of air as the child may catch cold. The oil may be conveniently a little tepid.

After the cleaning with oil, the child should be dry cleaned with a piece of soft sterile rag and then bathed in tepid water. The tender skin of the new born baby cannot bear any high temperature. The

AFTER DELIVERY CARE OF THE CHILD

temperature of water should be tested by dipping the hand or preferably the elbow before putting water on the body of the baby A *gumla* or a basin is to be used and the body of the child may be dipped in it

Treatment of the Cord.—After bath the child should be wrapped in soft rag and made comfortable The cord has now to be examined carefully again If blood is oozing out then another sterile thread should be used and a fresh tie put in The end should be treated with tincture iodine A little boric powder is to be dusted on the cord and navel and the navel has to be kept bandaged always with a covering of sterile rag or cotton Should the bandage get soiled with water or urine, it is to be replaced by a dry one If the place can be kept dry the extra length of the cord will fall off in 4 or 5 days, but if the place is moist or wet it takes longer time and it may suppurate Application of dry heat by warming the hand over a fire and pressing the part with warm hand is not necessary It may do some good but may also do incalculable harm Contact with dirty hands or cloth during application of heat is risky and the risk is too grave to be taken No rough clothing should be put against the skin of the baby Soft rags of different thickness and soft texture are the best These are to be changed as often as the child soils them They should be boiled and washed with soda or soap and well dried before using again

Sucking —After birth the cleaned and wrapped baby should at once be put to the breast for sucking

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As soon as the baby begins to suck, the uterus will contract and become small and hard. The nipples should be cleaned, rubbed and washed with hot water and boric lotion very thoroughly before the child is put to them. The fluid that comes out of the breast is laxative and is good for the baby.

First Day of Child's Life and After

Temperature :— The normal temperature is about 99.8°F. After the bath the temperature goes down to 99°F and remains at that. But it may so happen that the temperature has gone down two degrees below 99° between separation and cleaning. The child should be immersed in warm water to bring back the temperature to normal, then quickly dried and wrapped up.

Respiration at birth varies between 30 and 60. Pulse also is variable. It is 137 per minute for the first two months, 128 from the third to the sixth, 120 from seventh to twelfth month. 5th year—100. 10th year-boys—80, girls—90. Fever raises temperature by 4 beats to every degree whereas in adults the ratio is 10 beats to a degree.

Stools :— For the first two days the stools (meconium) are composed of bile and mucus from the intestines. From the third day the characteristic stool of infants begins, normally 2 or 3 stools are passed in a day. The intestines contain some nutritive matter in the new-born. For the first two days what the baby seeks from the mother is not milk but a substance

FIRST DAY OF CHILD'S LIFE AND AFTER

called colostrum which has got laxative properties Nature has made provision for nourishing the baby during the first two days from the reserve in the intestines Therefore laxative in the form of castor oil should not be given on the first or the second day Dependence on colostrum as a laxative is the natural way The baby should be nursed by the mother as if the baby was receiving milk from her from the time of delivery On the third day milk appears in the breasts

Urine — Slightly acid urine of pale colour is passed from 16 to 20 times daily During the first few days the total quantity is $\frac{1}{2}$ ounce to $1\frac{1}{2}$ ounces The quantity increases daily and by the seventh day it is about 10 ounces

Weight, Length and Strength —The normal child weighs 6 to 8 pounds according to height and development The child does not appreciably gain in weight during the first week Subsequently the average weekly gain is less than four ounces for the next six months The following is a chart which must not be taken rigidly

Chart of Height and Weight of Children

Age	Height	Weight
At birth	19 inches	7 pounds
End of 1st month	20 "	8 "
2nd month	21 "	10 "
3rd ,,	22 "	12 "
4th ,,	23 "	13 "

PREGNANCY : CARE OF MOTHER AND CHILD

(Chart cont.)

Age	Height	Weight
5th month	23 inches	14 pounds
6th ,,"	24 ,,"	15 ,,"
7th ,,"	24 ,,"	16 ,,"
8th ,,"	25 ,,"	17 ,,"
9th ,,"	25 ,,"	18 ,,"
10th ,,"	26 ,,"	19 ,,"
11th ,,"	26 ,,"	19 ,,"
12th ,,"	27 ,,"	20 ,,"

At the age of 10 months the child stands on its own feet if normally developed. Sickly and undeveloped children cannot stand and no attempt should be made to make them stand considering weakness of the leg bones. If weak children learn to stand and to walk late, there will be no harm but if they are coaxed to stand, the result may be injurious and end in permanent deformity. If the leg bones are weak, the weight of the body may bend them and distort them out of normal position. Normally children begin to walk a little at the end of the first year.

The child is born with two soft spots on the head. One is just on the top of the head and the other is in the back. The top spot may be seen to pulsate, it is so soft. The soft places get hard gradually. The back spot first and the top spot in about a year and a half. In sickly and undeveloped children or rickety children the softness may continue longer.

Cry :— To cry is natural for children. Parents instead of being alarmed at hearing a child cry should

on the contrary, consider seriously what has happened, should it not cry at all during a day. The cry of the child is nature's design to give exercise to its muscles and lungs. Without cry and therefore without this natural exercise the organs cannot develop normally. It will be therefore well understood why a baby should not be sucked everytime it may happen to cry a health-giving cry.

Feeding — For the first two days after birth no food is necessary for the baby. It is for this reason that nature has provided for flow of milk from the third day. For the first two days the breasts yield a yellowish fluid. This is called colostrum. It has laxative property. The babe on sucking this can with ease evacuate its bowels. For sucking for the first time the nipples require great preparatory cleaning. Preliminary cleaning should be gone through before the labour pain appears. In fact the nipples should have received care from the third month of pregnancy. Now the nipples and surrounding areas should be thoroughly washed with hot water. The child should be put for five minutes to each one of the breasts. On the first day the baby will be put to the breast every 6 hours. From the second day onwards every 4 hours. Between 10 P.M. and morning the baby should be given only a single suck. But the practice is just the reverse of it. Whenever the child cries the mother or attendants will try to soothe it by putting the mother's nipple to mouth. This is an injurious practice. There may be many reasons for the child's discomfort.

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for which it may cry It may be oppressed by heat or it may feel cold Folds of cloth may hurt the tender skin. Ant or insect-bite may have caused pain The stomach may have been too full causing discomfort. Stools may not be passing regularly and so causing discomfort or there may be gripping pain in the stomach for irregular feeding or feeding improper diet. All these may be causes But no. It is blindly taken for granted that whenever the child cries, it does so for hunger and not until the child refuses to suck, is any other cause for cry investigated. Generally the mother is given by nature more supply of milk than is needed by the baby by way of reserve So overfeeding goes on. The child sucks automatically and the mother suckles automatically till the stomach of the child gets overfull and it automatically disgorges the contents of the overfull stomach. But this does not awaken the mother or attendant to senses. The same thing is repeated This lays the foundation of future illness Overfeeding is a positive torture to the stomach. Constant misuse of the stomach upsets its normal working and the child develops signs of suffering from digestive troubles.

The baby, like all adults, requires water to drink. During summer months the baby perspires and throws off a lot of fluid Water should be given regularly to it Where the child refuses to take plain water it may be sweetened by plain sugar and boiled for sterilisation, cooled and then given one or two spoonfuls every 4 hours. If the child cries in the

intervals between feeding, do not try to quiet it by giving it an untimely feed

Honey is given to children. The way in which honey is usually collected is bad. The eggs and larvæ are squeezed out with the honey from the hive. The result is that the honey goes wrong and ferments easily. Such honey should not be given. Honey from apiary should be given.

The child should be suckled for 10 to 15 minutes at each breast every time. As a general rule the quantity of milk necessary may be stated as under :

The child requires $1\frac{1}{2}$ ounces for every pound of its weight per day. A child weighing 8 pounds requires 12 ounces of mother's milk per day.

Again calculated on age basis it may be generally said that a child requires as many ounces of milk per feed as the age in months plus one ounce. A child of three months' age requires 4 ounces per feed, feeding 5 times in 24 hours.

When cow's milk is given it should be diluted with water and a little sugar should be added to make it approach mother's milk. It is difficult to rear a child exclusively on cow's milk. When a mother cannot supply milk at all, a wet nurse should give the required milk. In case of shortage of milk from the mother or wet nurse the deficit is to be made up by use of cow's milk. For children up to 6 months' age cow's milk should be diluted with equal bulk of water. For the first week just a trace of sugar should be

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given rising from $\frac{1}{2}$ tola to 1 tola per day at the end of the week. Sugar is to be gradually increased with age.

Age	Water and cow's milk mixed half and half			
3rd day		12	ounces in 5 feeds	
4th ,,		14	"	"
5th ,,		15	"	"
17th ,,		17	"	"
End of 1 month		24	"	"
,, 2 months		25	"	"
,, 3 ,,		27	"	"
,, 4 ,,		30	"	"
,, 5 ,,		30	"	"
,, 6 ,,		30	"	Here vary dilution to 1 water with 2 milk.

Cleanliness in feeding is an essential thing. Many diseases of the infant are due to incorrect and unclean feeding. About breast feeding it has already been mentioned that the nipples should be cleaned. Every time the baby puts its lips it should be presented with a clean nipple. Several times during the day the breasts may be washed with neem water with advantage. Sometimes the milk comes out spontaneously and dribbles away soiling the skin and cloth about. The milk remains soaked in cloth and dried on the skin and invites infecting bacilli. Therefore it would be only right to wash the breast with a neem lotion every time the child is put to the breasts. If neem lotion

BATHS SUN AND DRY HEAT

is troublesome to get everytime, plain warm water should be used

When cow's milk is fed scrupulous care should be taken to get fresh uncontaminated milk Milk should be boiled The cups and spoons used should be cleaned bright everytime after use and washed with boiling water Ordinary wash water may contain germs and reach the child's stomach mixed with milk The milk should be first diluted with its equal bulk of water, boiled and then mixed with sugar

Baths —The child should be gradually accustomed to tolerate cold bath For the first few weeks water heated by sun's rays may be used and then simply cold water may be used During winter tepid and during summer cold water is to be used Cold water gives vigour and tone to the skin stimulating its action besides washing away deposits due to visible and invisible perspiration Daily anointing with oil in the sun followed by a cold bath is very health-giving

Sun and Dry Heat —The child should be regularly given sunbath every day At the same time the baby should be anointed with oil The effect of sun's rays on oil is specially beneficial The oil should be rubbed in by gentle massage Children who get this treatment are better able to withstand changes of atmosphere and also attacks from infectious diseases Sun's rays are life and energy giving and at the same time they kill the microbes

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The child should be kept warm. The womb of mother is always at blood heat and therefore the baby gets accustomed to live at that temperature. It gets the first uncomfortable feeling of coldness on coming out of the womb and then it cries. In a hot country like that of ours, no artificial warmth is necessary during summer months. Light clothing to maintain child's body heat is enough. If it perspires leave the child quite naked. But in winter besides covering a little extra warmth will be welcome. A bottle filled with hot water and then wrapped in cloth may be put along the sides of the bed. Care should be taken that the cork of the bottle is sufficiently pressed down to prevent leakage and also should be seen that the wrapping over the bottle does not come off. Hot water bottles are specially necessary for babies delivered before full time. The heat control mechanism of the child develops slowly. Exposure of the child to high temperature is injurious.

Weaning —The time for weaning is generally accepted to be from the ninth month. But the time has to be chosen according to circumstances. If breasts begin to fail early, weaning should commence earlier. Where the supply of milk is copious and the mother and the child both are thriving, breast feeding may be continued up to the end of the first year giving some farinaceous food in addition from after ninth month. If the mother is sickly or if she menstruates, it is a sign that weaning should commence. Mother's milk lacks in certain components and feeding a child

WEANING TEETHING

entirely on mother's milk after the first year, will tell upon the health of the child and make him rickety

Weaning should be a gradual process. At first some cow's milk mixed with some sago water is to be artificially fed. The quantity of cow's milk and sago is to be gradually increased till mother's milk will no longer be necessary. Children can digest starchy food like barley, sago or rice only when teeth have begun to appear. Teething upsets digestion so that weaning is to be held over till the disturbance due to teething is over. Teething commences usually from the sixth month and therefore by the ninth month the disturbance is generally over which therefore is regarded as suitable period for commencing weaning.

Teething —The temporary or milk teeth appear first. At birth the teeth are under the gum and they are then soft and undeveloped. After birth they begin to grow up by absorbing the covering material and gum and converting them into bone. The teeth make their appearance by the removal of the covering capsule. These milk teeth begin to appear in pairs generally from the sixth month up to the middle of third year. Then the permanent teeth begin to push them out gradually. These fall off one by one and the vacant spaces are taken up by the growing permanent teeth. Sometimes a third time the teeth appear in very old men or women over 80 or 90 years of age.

PREGNANCY : CARE OF MOTHER AND CHILD

The milk teeth or temporary teeth appear in the following order .

- 2 Incisors of lower jaw 6th month
- 2 , , of upper jaw 7th-8th month
- 2 Lateral incisors of upper jaw 9th month
- 2 , , lower jaw 10th month
- 2 Molars of the lower jaw 12 month
- 2 , , upper jaw 14th month
- 4 Canine teeth of upper and lower jaws
16th to 20th month
- 4 Grinders of upper and lower jaws
20th to 30th month

By the 30th month all the 20 temporary teeth have appeared These continue to function up to the 6th or 7th year Then permanent teeth begin to appear in the space for molars and with their appearance the central front teeth fall off By the 9th to 12th year all the 28 permanent teeth are out Four grinders appear slowly later and two wisdom teeth may appear very late The total number of teeth when all have appeared is 32

The months are only approximate but generally in a very large number of cases teeth appear as scheduled above The period is a period of change in other directions During teething the child becomes irritable and very susceptible to digestive or nervous disturbances Many diseases may coincide with the time of teething but it would be wrong to think that all the various ailments of the child at the period of

TEMPORARY OR MILK TEETH

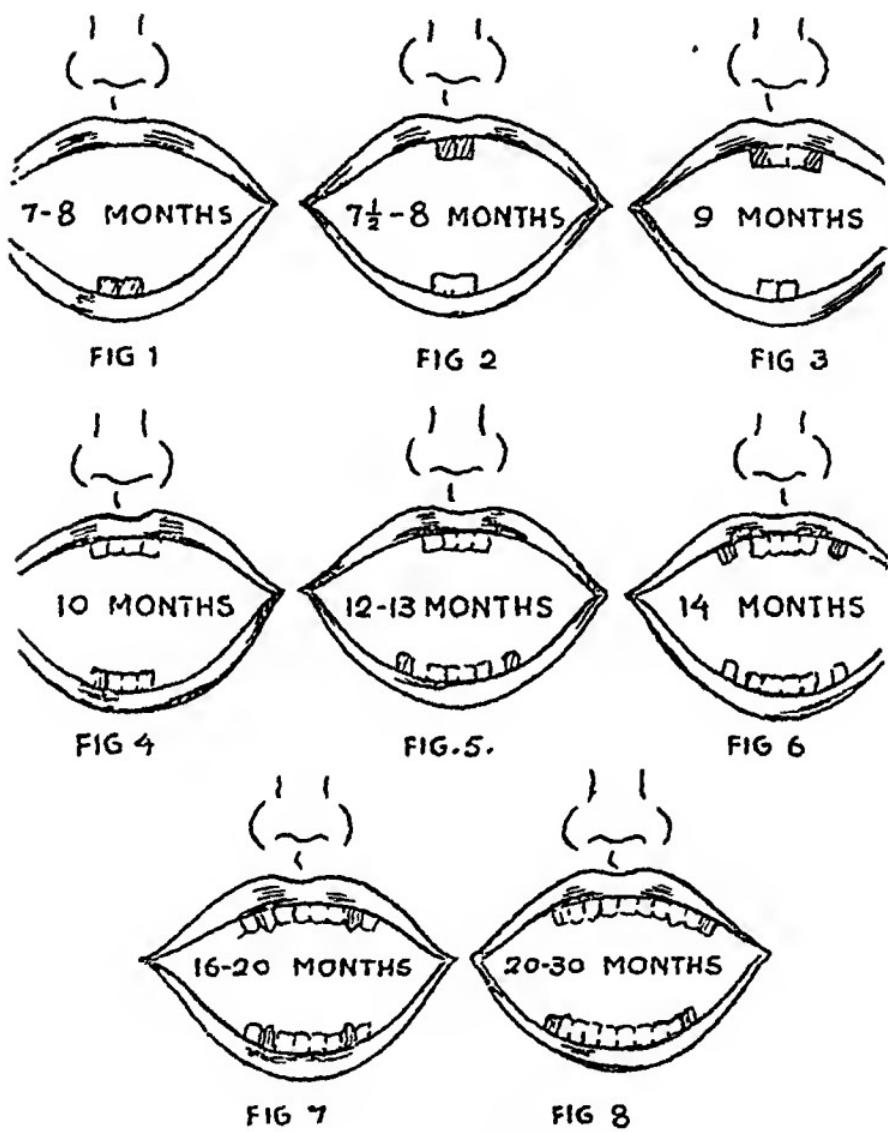


Fig 150. Milk teeth

the first appearance of the teeth say, from the 6th to 9th month, are due to teething

A healthy child cuts teeth without disorder. He is irritable and restless at this period. During this

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period only tendency to constitutional defects is accentuated. If the nervous system is weak and unstable the child may have sleeplessness and even convulsions. Those who have a habitually weak digestive system develop diarrhoea and those who have weak respiratory system will develop bronchitis. Deficiency in proper feeding, vitamin and calcium deficiency, unhygienic bringing up are mostly responsible for these susceptibilities and the deficiencies and errors should be found out and corrected.

The child exhibits some signs such as dribbling of the mouth, desire to put things in the mouth, irritability and restlessness by which the approaching eruption of teeth may be guessed. At this time food should be curtailed by one fourth of normal. The child should be supplied with something hard and elastic to chew. No changes in food should be made at this time as digestive organs become irritated. The gums should be rubbed and the child taught to cleanse the teeth daily. At the age of 4, the child may do it himself but from the very childhood the mother should have the teeth rubbed and cleaned, being the first thing in the morning.

When the gum is red, swelled and tender, it will indicate that the teeth are finding obstruction. Give the child something hard to chew during teething. Sugarcane, rubber ball, wooden toy etc are good. At this stage diarrhoea or other diseases may appear as already stated according to the constitution and

DISORDERS DURING TEETHING SLEEP

predisposition Gums should be lanced at this stage It is a simple operation The child is to be held firmly on the lap If the upper jaw has to be operated the operator stands from behind the head, grasps the head with his left hand and opens up the gum, driving the gum lancet in till it scratches against hard teeth

On most occasions lancing the teeth will act like a charm in curing the child of the distressing symptoms When the ailments persist after lancing, the diseases should be treated according to symptoms

Sleep —On the first day the child may sleep off the whole time Sleep at this stage not only does not interfere with growth but is conducive to growth The child was accustomed to sleep in mother's womb and draw nutrition from her At birth the mother having naturally dosed the child with food for about 2 days all that the child needs is occasional suckling and passing of stool and urine and all the rest of time it should be sleeping During the first few weeks the child should be sleeping 22 hours out of the 24 After this, need for so much sleep decreases and the child may keep awake contentedly for an hour or so. So up to three months the child can be no exhibit for relations and attempts to exhibit the child and disturb its sleep must be regarded as injurious to it A little after, some part of the time will be occupied by the mother in entertaining and also in training it during its wakeful hours

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Sleeping time for average child has been worked out as under :

At birth	21-22 hours
3 months	19 "
6 " ,	16 "
1 to 5 years	14 "
5 - 7 " ,	12 "
-	11 "
Childhood	10 "

Exercise :—The child requires some exercise from its very birth. Even before birth in the womb the child does some exercise by the way of stretching the legs or hands as become apparent to the mother when little tumour-like swellings created by the push of the child appear and disappear on the abdomen. These movements of the foetus when perceived by mother are called quickening. Immediately after birth it continues to behave as if it were in the womb and has little time to spare for waking and exercise, as practically all the time is taken up by sleep. But when it is awake it exercises vigorously by moving the limbs, changing sides and making swimming motions vigorously as weeks pass. Next comes the period of control of hands. The child grasps at things or pulls itself or throws the legs and hands about in glee and performs exercise. It learns to crawl and then to stand—all these involve exercise. Walking is fatiguing to the child and the normal desire in child-to walk should neither be curbed nor encouraged.

DISEASES AND WHAT MOTHERS SHOULD KNOW

Some facts about child's development

Fontanelle closes	18 to 24 months
Holds up head	3 — 4 ,,
Cuts tooth	6 — 7 ,,
Sits up	9 — 12 ,,
Walks	12 — 18 ,,
Talks fairly well	by 2 years

Diseases and what Mothers should Know

Observation —Most of the diseases of children and also of adults are preventable, meaning that we know the causes and may take care to remove the causes It is easier to prevent diseases in children than in adults for children are under the constant care of the mother and if the mother is careful, wise and knows how to watch and guard against onset of disease, the probabilities are that many diseases will be either entirely prevented or cured at the earliest stage

Accurate observation on the part of the mother is necessary and whenever any abnormal symptom is seen she has to take proper measures

The behaviour of children undergoes marked changes in illness They become restless, fretful or apathetic or irritable The appetite is uncertain, the vigour and tone of movement is lacking, the appearance of contentment is gone in disease The brow becomes puckered, the face may bear expression of pain, anxiety or weariness

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The Cry of Pain :—The cry is characteristic and by some effort the mother may understand the meanings of cries. A cry for a feed or for calling attention to discomfort or one prompted by a desire to get a change of position or for getting rid of wet bed, can be understood and on examination the causes of discomforts corrected. Sometimes the little babes will cry simply to get petted. The mother has to interpret the cries. The cry of sickness is different from the cry of these temporary inconveniences. The child soothes down when the inconvenience is removed.

But the cry of sickness is in altered tone. It may be a sharp scream of acute pain, the low moaning of continued discomfort or the cry may be a repeated cry of exhaustion or whispering one of laryngitis. The actions and tone will almost always reveal the seat of pain or discomfort.

Colic .—The commonest cause of gusts of screaming and crying in infants is colic. The lower lip is drawn up, the hands are clenched and the legs also are drawn up. Earache may be mistaken for colic but in the case of earache the child will rub the ear, burrow the head in pillow or arch the body backwards.

Disturbed sleep is a sign of illness. Certain types of illness show certain characteristics. Teeth grinding indicates gastric or intestinal troubles. Sudden waking and snorings indicate that something may be wrong with the adenoids or tonsils.

INFANTILE DISEASES

Oedema —It suggests kidney disease and if on the extremities weakness of the heart or malnutrition

Discharges in ear are due to inflammation and an inspection may show where the inflammation is

Throat examination will give a clue to many diseases There may be tonsillitis or pharyngitis but the more serious diphtheria also may be present which an inspection of the throat will reveal

Respiration ratio to pulse is to be checked Normally it is 1 to 4 or 1 to 5 But in lung disease it is disturbed and becomes 1 to 3 or 1 to 2 Signs of deficient aeration of blood will indicate bronchopneumonia There is difficulty in inspiration The muscles of the neck contract, the spaces between the ribs are sucked and the nostrils dilate widely in the effort to draw in breath but in spite of these the urgency remains unrelieved The normal rhythm of respiration is reversed Normally there is inspiration and immediately expiration followed by a pause In difficult breathing the order is inspiration with effort then the pause then expiration followed by inspiration

In bronchitis there is also difficulty in breathing but it is not so pronounced In asthma the inspiration is easy, but the expiration is laboured and prolonged Rapid and deep breathing is often a sign of acidosis, if it is unaccompanied by signs of disturbance in lungs or circulation

Abdomen —In diseases of the abdomen the legs are drawn up and if they are straightened, the child will resist. The abdomen is normally flat after second

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year. If it is prominent, some digestive disturbance is to be apprehended. This may suggest dyspepsia, or constipation or rickets. The softness of the normal abdomen may be disturbed by disease. If there is resistance to pressure, then dysentery may be one of the causes.

Spleen and liver may be enlarged indicating malaria or kala-azar.

Vomiting —Children are easily found to vomit. The cause has to be ascertained if it is persistent and continues for a long period. A little pressure on the stomach or a little overfeeding may cause vomiting. But an acute attack of vomiting although often associated with digestive disturbance, is not always so. The onset of acute infective diseases may provoke vomiting.

In early infancy some children vomit a quantity of food after each feed. If the baby is held upright after feeding any accumulated gas or air will escape thus lessening chance of vomiting. In some this indicates overfeeding which can be easily corrected. It may also be due to want of control over the stomach. Disease of the middle ear and influenza may cause vomiting.

Vomiting may be an indication of whooping cough although the actual whooping sound may not be observable immediately.

Stools —During the first two days of life the stools are blackish in colour. After this the stool becomes soft and pale yellow. Normally children pass stools two to four times a day. Acute diarrhoea

MANAGEMENT OF INFANTILE DISEASES

may cause green stools to be passed. These stools are highly acid. The buttocks become reddened in such cases owing to the acidity. Sometimes these stools are due to infective diseases. Occasionally the cause of diarrhoea may be elsewhere. Stools may show excess of fat in diet or there may be pellets of soap formed by excess of fat.

When there is excessive protein in diet, then the stools show putrefactive odour. Tough yellowish protein curds are also present in these cases. When there is too much starch in diet, diarrhoea is then characterised by copious stool, frothy and of light yellow colour.

Worms may be examined for in the stools as their presence is very common.

Remedy in these cases will primarily depend upon the mother. By the application of hot and cold water, by massage and administration of a few drops of castor oil and above all by the regulation of feeding, the mother may check development of most of these ailments.

In all diseases of the digestive system the first thing is to correct errors of food. Those who rear children on breast milk only should seek for the causes of ailment in overfeeding or underfeeding or irregularity of feeding, want of bath and inadequate supply of water to children. Those children who are fed on cow's milk or partly on breast milk and partly on cow's milk get frequent disorders of the stomach. Cow's milk is not suitable for little children and the

PREGNANCY : CARE OF MOTHER AND CHILD

errors have to be corrected by dilution, by addition of sugar and by addition of cream after dilution to make up for fat deficiency. Cow's milk is acid, and mother's milk is alkaline. This difference also tells upon the health of the child. Addition of a little lime water may correct it, but lime water may cause constipation which is to be corrected by occasional use of a few drops of castor oil.

For costiveness and dysentery and also diarrhoea castor oil is a great help. Castor oil may be rubbed on the abdomen and a few drops may be mixed with milk and fed. It is harmless, at the same time helps the child to get rid of toxins accumulated in the stomach. In fact in most cases of stomach trouble nothing need be done beyond correction and regulation of food and use of a few drops of castor oil with milk.

The action of the skin is to be stimulated particularly in case of illness. Immersion in cold, tepid or warm water and rubbing the skin while in water has wonderful effect in healing many diseases in incipient condition. Application of hot water by immersing the child in it, will relieve most sort of pain and in some cases the daily cold bath may be substituted for hot baths. For pains on the chest, colds etc. a little camphor dissolved in oil will make an excellent rubefacient liniment, relieving pain.

For colds and bronchitis beyond use of warm baths and camphor liniments, the use of little vasaka powder (tablet) rubbed in honey and put on the tongue of the child is useful. It helps expectoration. Massage is

MANAGEMENT OF INFANTILE DISEASES

also of great use in promoting circulation which carries off offending materials and eliminates them through the skin, stools and urine

Feeding of plenty of water after each meal is also a good way of helping elimination of toxins causing trouble

The virtues of exposure to sun cannot be too much extolled in keeping the child in health and bring it back to health, if ill. Stufiness in rooms should be removed and child should be given plenty of fresh air and facilities to exercise according to strength

Fondling is detrimental to health. It helps none but causes harm. The habit of keeping the baby on lap when asleep is also conducive to illness. In the lap the child gets warmth which may be unnecessary for it while it may sleep peacefully and comfortably in bed. But once the habit is formed it is difficult to remove.

Irregularities in times of passing stools is also a disturbing factor. Children's capacity to answer to calls of nature at regular intervals is wonderful. Only the mother has to feed it at regular intervals it will get hungry in those hours. It has to be put in a position for passing stools at definite hours and the habit will be formed. It will be easier for the mother to detect abnormalities early and correct before any disease develops

Use of air and water, massage and sun, regulation of diet and promotion of elimination are all that are mostly necessary to keep children in health and in bringing them back to health in case of illness

PREGNANCY CARE OF MOTHER AND CHILD

Convulsion :—Convulsion is not a disease but a symptom of diseases which affect the nervous system. Convulsion in an infant is indicated by contraction of the muscles of the face and eyes, rigidity of the body, clenching of fists and slight frothing of the mouth. It is associated with feeble and shallow respiration, feeble action of the heart and occasionally cyanosis of the extremities. There may be a single attack or a series of attacks may follow each other.

In infantile convulsions the causes are fevers, malaria, meningitis or severe injury, retention of urine, pressure of undigested foods in the intestines, sudden exposure to extreme cold, teething, round worms etc. Toxic conditions may also cause convulsions. Generally speaking convulsions in infants are the equivalent of eclampsia in pregnant women. When children are attacked with convulsions, attempts should be made for determining the causes and to remove them where possible, as in the convolution of dentition or of indigestion. But some measures are common for all cases and should be adopted without any loss of time. The infant should be immediately placed in a hot bath (100°F) for about 5 minutes, while cold water should be applied to head with the object of relieving the congestion of blood in the brain. A piece of towel soaked in cold water and wrung out may be applied. After about 5 minutes the child is to be removed from the hot bath and quickly dried and wrapped up in soft clothing and left undisturbed. If this will not stop convolution, sedatives should be given. No

CONVULSIONS GREEN DIARRHŒA

medicine should be attempted to be given by the mouth when the infant is unconscious, for obvious reasons. In such case enemata containing sedatives should be given. Bromide of potassium 5 grains in 2 or 3 ounces of water is to be injected rectally and repeated every 2 hours till convulsion ceases.

In most cases convulsions are due to toxic condition of the intestines. This should be attended to by washing out the bowels by enemata, by purgatives and intestinal antiseptics. After the convulsions cease, usual treatment may commence.

Green Diarrhoea — When an infant passes more than six stools in 24 hours he may be said to have diarrhoea. This is mostly due to toxins in the stomach and intestines created by bacteria. The bacteria gain entrance through food, bad milk or from contaminated water or sucking bacteria-infected nipples.

The stools are green, foul-smelling and show semi-digested curd. The irritation caused by stools affects the skins of the buttocks and anus. If unchecked the child becomes unable to assimilate its food, gets emaciated and dies. The disease should be prevented knowing its dangers. Milk, milk bottle or cups, spoons etc and the nipples in case of breast-fed infants should be kept clean and in aseptic condition. If curds appear, these should be cleared out of the stomach and intestines. A teaspoonful of castor oil should be taken along with fractional doses of calomel 1/12th grain and soda bicarb 2 grains per dose and 4 to 8 doses per day. For

PREGNANCY : CARE OF MOTHER AND CHILD

children of a few months old, diarrhoea tablets in 1/10 tablet doses may be given if necessary. But it is expected that nothing beyond calomel will be necessary.

Injuries to the skin about the rectal passage should be attended to. Scrupulous care should be taken in keeping the buttocks clean. The region should be washed with warm water and boric ointment applied. For obstinate cases painting of picric acid lotion has been found to be very efficacious. The solution should be of picric acid 1 grain to one ounce of water.

Infantile Jaundice — This is a symptom and not a disease. It may be due to destruction of blood corpuscles or to the absorption of bile or to congenital diseases such as syphilis or malformation of the liver. Simple jaundice requires no treatment, besides attention to diet and hygiene. A mild laxative in the form of soda sulphate in 5 grains doses 3 times daily may be given.

If jaundice is due to sepsis then the prognosis is grave. Jaundice may originate from septic condition of the umbilical cord. In that case the cord must be treated antiseptically and dusted with boric powder and then bandaged. If sepsis is due to syphilis, the treatment should be as for syphilis.

Inflammation of the Eyes in New-Born — It is an infectious disease of the eyes of infants. Bacteria may get lodged within the eyes. This happens most frequently during the passage of the head through the vagina. It may also happen subsequent to delivery. The entrance of gonococcus into the

OPHTHALMITIS OF THE NEW-BORN

eyes is responsible for the blindness of most of the born-blind. These men were not born blind but lost their eyes a few days after birth. The symptoms begin two days after birth. The eyelids become swollen and inflamed and a purulent discharge flows from them. In severe cases opacity and ulcer of the cornea may form leading to partial or complete loss of sight.

Although the results are so dangerous yet the disease is wholly preventable. It should be a routine course to wash the eyes of the baby with boric lotion 8 grains to an ounce as soon as the head emerges and even before the whole body has come out or the placenta is expelled. The baby should have then a few drops of boric lotion in both eyes. Where venereal disease in the mother is suspected or where the mother is discharging pus owing to any trouble in the passage or when the mother has leucorrhœa, simple application of boric lotion is not enough. In such cases the eyes should be washed with boric lotion and within each eye a drop or two of silver nitrate lotion 8 grains to the ounce should be applied. This should be followed up by a wash with sterile sodium chloride solution 4 grains to an ounce. Otherwise the silver nitrate if left in the eyes may cause irritation.

It should be known that blindness immediately after birth is preventable. Of course, the disease may be contracted at any period during infancy due to contaminated fingers or contaminated cloth coming in contact with eyes. If only one eye is affected the

PREGNANCY . CARE OF MOTHER AND CHILD

other should be protected by dusting boric powder over it and lightly bandaging with a pad of cotton. The sore eye should never be bandaged. Bandaging of the healthy eye should be removed twice a day and the eye examined for infection. The eyes should be washed with boric lotion 4 or 5 times a day when they are affected and silver nitrate lotion should be used once or twice daily. If the infected eye is bandaged, discharges accumulate under the eye lids and very soon corrode the cornea causing irreparable injury. In all eye diseases when the lids stick to each other, attention should be given for keeping them separated and eyes washed out frequently.

Retention of Urine :—It sometime happens that the infant after birth does not pass urine normally within 5 or 6 hours. If it does not do so within 24 hours then it must be due to defect in the urinary passage. It usually happens that something like the waxy deposit that covered the foetus got deposited inside the urinary passage and blocked it, as if by a plug. This plug has to be removed. That urine is stopped in the bladder will be felt by palpation. If the plug is found near the orifice it may be washed away from outside. If the infant still does not pass water then the waxy plug which may be far in the interior of the urinary passage, should be melted out. The child is immersed in a hot bath and allowed to remain there for a short time. By holding the hand in front of the orifice it will be possible to feel whether the child is passing urine or not. Put a narrow betel

RETENTION OF URINE THRUSH FALSE MEMBRANE

leaf stalk or rubber catheter into the penis, this will irritate the bladder to micturate. It is believed that administration of a few spoonfuls of cold water while under water helps the process. If all these fail then a catheter is to be sterilised, lubricated and passed, whether the child be male or female. A catheter No 1 or No 2 will serve the purpose.

Thrush or Stomatitis or White Spots in Mouth —
This disease is due to the use of contaminated milk. The white spots are created by the entrance and growth of a fungus on the mucous membrane of the mouth. This fungus is found in impure milk which decomposes on mother's nipples or on spoons and cups. The spots are produced by colonies of fungus. By growing they coalesce with each other and form a sort of false membrane.

False Membrane —This may cover large patches in the cavity of the mouth extending to the pharynx and oesophagus. Diarrhoea is associated with it. The disease is preventable. Antiseptic care of the mother's nipples and feeding utensils will prevent it. The lips of the infant may also let milk to dry on them and attract fungus. The lips therefore should be wiped with moistened cloth after every feed. Equal parts of honey and fried borax powder made into a thick paste and applied two or three times a day will destroy the fungus and act as antiseptic also.

Tetanus —This is dealt with in the chapter on Infective Diseases.

CHAPTER—VIII

ACCIDENTS

Preparation for First Aid

Aid has to be given in case of accidents. According to the nature of the injury and its severity, it may be merely a little help to allow the patient to get over, or it may be of the nature of a first aid so that the patient may get time to see a qualified person and have aid of his skill and appliances. The resources of the home doctor are limited, yet much may be done by intelligence and sympathetic use of resources.

In case of an accident the nature of it should be ascertained as to how, when and where the accident took place. It may be that the patient is unable to speak, then those who know should be questioned.

An insensible man should be laid at full length, if necessary, on the ground and his clothing should be taken off. The head should be placed a little higher by improvising some sort of a pillow from the clothing. He should be laid preferably on the right side as this will render breathing easier.

Water should be procured and if the injured man can drink, water should be given for drinking. If he is unable to drink or is insensible, water should be splashed on head and face and wiped dry. The limbs

PREPARATION FOR FIRST AID

and head and trunk should be examined one by one to determine the site and nature of injury. If there is bleeding, steps should be taken to stop it at once. The methods are described in detail in the following pages. Pressure has to be applied on the artery or vein which may be bleeding. Mere pressure of hand might do, or a tourniquet may have to be applied. Tie the limb first and then tighten the tie by passing a rod and twisting. This will prevent bleeding in most cases. If the man has been cut and the wound is causing bleeding, tie the wound with cleanest possible cloth available at the moment after washing out dirt. This will protect the wound for the time from exposure and dirt. If it is a fracture or a dislocation try to reduce it, if it is severe and must at once be set right. Otherwise remove the man to a proper place of treatment and treat him with antiseptic precautions as described here after. If the limbs are so damaged that movement will do more injury or cause great pain, and the man has to be removed, then have his limbs temporarily bandaged using a stick or umbrella or the injured man's uninjured limbs or trunk as splints.

If it is a case of burn, the clothes if still burning should be extinguished by smothering the fire by rolling the man on the ground and not allowing him to run about. Then he should be taken to the nearest place suitable for treatment. But a better way is to throw a thick covering sheet over the person and prevent access of air, if any thick cover like a blanket is near at hand.

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Often a carrier has to be improvised. Two long pieces of bamboo passed through two pieces of gunny bag will serve as a stretcher. The space between the two poles may be kept stretched by the use of two cross battens tied to the ends. If gunny bag is not available, a thick *chaddar* may be laid on the improvised frame, made fast lengthwise by rolling on the poles and tying. Such a stretcher should be carried on hands swinging low and not taken on shoulder. Two or four persons may carry this stretcher. The men behind may observe the patient while he is being carried. Care should be taken on ascending and descending a slope so that the patient may not roll down. The stretcher should be kept horizontal as far as possible. The injured man should be freed from the circle of men round him who may be watching him but shutting out access of air to him. It should be seen that an injured man has plenty of fresh air. If it is a case of drowning treatment should begin at once by cleaning his mouth and by commencement of artificial respiration.

For carrying an injured man, two persons may sit face to face and form a cradle by clasped hands. The patient may sit on this and catch hold of the persons with his hands. The carriers are to stand then and proceed with the journey. An injured man may be carried on the back singly. There are various other methods, for carrying injured persons.

PREPARATION FOR FIRST AID CUTS

The first duty on receiving a case of accident is to stop bleeding, if the patient is bleeding from any where If it is a case of asphyxia, artificial respiration should be begun with arrangements for warming up the extremities If it is a case of snake-bite, the first thing is to put a ligature If it is a case of drowning or burning, immediate attention should be given for excluding air, even after fire is extinguished and the patient should be covered with layers of blanket for the purpose In all cases of severe accident, shock should be reckoned as a grave factor and attention given to counteract shock

Cuts —When there is a cut, it may be superficial, the skin only being affected The cut may go deeper into muscle Cut is a break in the protection by the skin A certain class of infections which can be communicated through opening in the skin or by admixture with blood, finds easy entrance into the system through cuts Tetanus and plague are very dangerous and infectious diseases which may gain entrance through cuts Apart from these, if precautions are not taken, the cut is likely to suppurate before healing and cause trouble

In case of a cut immediate antiseptic measures are to be taken A touch of iodine is a perfect thing, if iodine is available If not, boric acid solution will do Neem is one of the most useful antiseptics Neem leaves boiled in water may be used Garlic is a very good antiseptic It is easily available. Garlic is to be pounded and the juice applied on the cut Whatever

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antiseptic be used it is of the utmost importance that all dirt must first be washed out and after application of antiseptics the cut should be protected by a bandage. Mere application of an antiseptic without bandaging is of no use. The cut may be healed by this simple process. But it may suppurate when it should be treated as an wound.

Blows :—Blows received on muscle or bone may create bruises. They are painful. If the skin is unbroken, nothing need be done beyond cold application by bandage which is to be kept soaked. Mud poultice also is useful in bruises.

If the blow is severe, proceed as with sprain. If the body aches on account of severe blows, garlic taken internally is of use. Where cold application is not possible, hot fomentation may be found of use.

Fall :—A fall from some height may cause mischief in the shape of sprain, fracture or dislocation. Or in the least it may be a severe shaking. If the person faints from shock then proceed as described under fainting or swooning. Remove clothing, apply cold and let fresh air play on him. If there is suspension of respiration and cold splashes do not bring in consciousness or respiration, proceed with artificial respiration as in drowning. A fall may cause a fracture or dislocation or sprain. Treatment is indicated under these heads.

Sprain :—It occurs when a joint is violently wrenched or twisted with partial rupture of ligaments or tendons and stretching of muscles near the joint.

SPRAIN · FAINTING

It is often complicated by laceration of tendon sheaths and fascia in the neighbourhood of joint. A rapid and painful distension of joint due to bleeding follows and the swelling often is increased with acceleration of temperature.

In treatment of sprain, it is to be observed that neither the swelling nor the pain can subside so rapidly as the patients generally desire. Continuous application of cold is one of the best methods of treatment. This may be effected by application of mud poultice changing it often or by a cold water pad. The part should be bandaged to prevent further strain on the muscles and rest given to the joint. Sometimes application of warmth gives more comfort to the patient. Cold or hot application may be decided keeping patient's comfort in view.

In sprains the bandage should be taken off once daily and sun's rays allowed to play on the part while it is massaged. Massage induces circulation and helps healing. After massage the part is to be bandaged and given rest. Sprain at the ankle joint takes a long time to heal, for in standing or walking the part is strained and it is difficult to give necessary rest unless the patient takes to bed.

Swooning or Fainting

It is a term applied to the state of unconsciousness due to suffocation or due to interference of any

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kind with the oxygenation of blood. It may be a resultant of drowning, strangulation or throttling. It may be due to obstruction of flow of blood into the brain.

Externally the main symptoms are blueness of lips and prominence of eyes. In case one dies of it the rigor mortis or stiffness of muscular fibres and joints comes slower than normally. In fainting the immediate necessity is to allow more blood to the brain. For this purpose the patient's head is to be kept down lower than the level of the body. Cold water should be dashed on the face and cold air admitted into the room. The limbs should be rubbed. Ammoniacal smell often brings in consciousness. For this purpose burnt feather is to be brought near the nose. In prolonged fainting mustard plaster should be put over the heart. If breathing stops, artificial respiration may be resorted to.

Syncope is the term applied when there is a sudden fall of blood pressure causing anaemia in the brain and loss of consciousness. The extremities become blue. Prolonged syncope may result in death. Whenever there is cessation of respiration, artificial respiration has to be resorted to.

Artificial Respiration.—It is an immediate necessity in all cases of failure of respiration.

Instantly place the patient's face downwards on the floor with a rolled up cloth or coat or anything which will be available for such purposes, under the lower part of chest so that the head hangs down or remains

ARTIFICIAL RESPIRATION

at a lower level Turn the face of the patient to one side and bending the arms place them below his head Keep the mouth open. See that there is no foreign body in mouth or throat Then place yourself in a



Fig. 151. Firm pressure on back to expel air from lungs (expiration)



Fig. 152 Relaxation of pressure (inspiration).

kneeling posture by conveniently putting your knees on either sides of the patient Then place your hands flat over the lower part of the back at the

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point of the lowest ribs, one on each side and gradually throw the weight of your body forward on them so as to produce a firm pressure, remembering that it must not be violent on patient's chest. By this means the air is expelled out of the lungs. Next raise your body slowly so as to remove the pressure keeping the hands in their place. Repeat this forward and backward movement every 4 or 5 seconds or 12 to 15 times per minute. There should not be any marked pause between the movements. This course must be done until the natural respiration resumes. Sometimes it may resume and fail. This method should then be again pursued. Artificial respiration is to be continued for a great length of time with perseverance and given up only when rigor mortis sets in. This being done arrange for applying heat to the extremities by rubbing them with warm cloth or if possible, by applying hot water bottles. Care should be taken to see that the bottle is not very hot. The skin of a fainted or apparently dead person gets more easily injured by heat.

Drowning

As soon as the man has been removed from water, place his face downwards and raise body by holding at the waist, placing your hands on the abdomen. Another is to open his mouth and hold his tongue extended. This process will help the accumulated water in the stomach to come out.

DROWNING

Then place him on the ground in a supine position and tear away his clothes from the body. Loose the clothings of the waist. Then go on carrying artificial respiration as described under fainting. Make some fire and foment or apply heat to the extremities taking care not to scald the skin. All these should be done very promptly. If respiration has not failed but he is unconscious apply enough heat in form of dry fomentation and keep wrapped with blankets. Hot water or milk should be given as stimulant drink as soon as consciousness returns.

On regaining the respiration keep the patient well warm on blankets and go on treating the case as in pneumonia as this is the commonest complication after drowning.

External Symptoms of Drowning — Froth in the mouth, relaxation of penis, goose-skin appearance, sand, mud, weeds etc under nails and in the grasps of hands. Wherever possible children should be taught to swim quite early. Learning of swimming becomes more difficult, the more one advances in age. When a man is in water and runs the risk of drowning, he should have the presence of mind to throw off all clothes and become naked. Those who know swimming run less risk of drowning in doing so. The body becomes light. Rescue also becomes easier.

Those who may chance to see a drowning man, but do not know swimming or dare not

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jump down to rescue should make all efforts to make a rope line and throw that on to the drowning man A rescue line may be made by tying dhoties end to end They may be torn across width and a single dhoti may go to make 20 yards of rope in an emergency.

Strangulation and Throttling

Strangulation is generally found in suicidal cases whereas throttling is always homicidal. In either cases remove the body by cutting the ties or ropes and proceed with artificial respiration. In cases of strangulation if the neck is broken or there is dislocation of the first cervical vertebra, then the case is absolutely hopeless Care should be taken in cutting the cord round the neck so as not to injure the skin anywhere. When the neck is not broken or dislocated, artificial respiration should be tried patiently although there may be no sign of returning life. This is to be done by relays of men till rigor mortis sets in.

Burns and Scalds

The effect of burns or scalds on a person depends not only upon the intensity of burn but upon the extent, situation and age of the person Burn may be only superficial, yet if it is extensive and on face, head or trunk, it may be more serious than if there is a deeper but limited burn on the extremities In

CLASSIFICATION OF BURNS : SCALDS

children the effect of burns is more comparatively serious When boiling water scalds a person the injury may be less severe for the water quickly cools and also runs off But if a scald is produced by boiling oil, it adheres to the part and causes serious wound On account of flowing of fluids scalds usually cover large surface and extensive injury of the skin is bad Only vesication over large surface or over considerable areas on breast and stomach are known to cause death Indeed in extensive burns the prognosis is bad

It is customary to classify burns into degrees according to the intensity A burn of the first degree is only redness of the skin Burn of the second degree means vesication, while in a burn of third degree the injury is limited to destruction of the cuticle and also part of the true skin In the fourth degree destruction of the whole skin is accomplished In the fifth degree the burn runs deeper and muscles are reached In a sixth degree burn, the whole limbs are charred

The effect of burn is constitutional, the whole system being affected In slight burns of small extent there may be no constitutional effect Even if the burn is deep but the area is small and the extremities such as a foot or hand are involved there may be no constitutional effect But if the burn is extensive and involves chest, abdomen, head or neck, then even if the intensity be of the first or second degree the result may be serious, specially if the patient is a child The first effect of burn is shock The shock is very

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great if there is extensive burn, also in slight burn over head, face, chest and abdomen. The patient becomes pale and shivers, extremities get cold, the pulse becomes small. If shock is so great that the patient feels little or no pain, then the possibilities are of the patient passing into a state of coma after which death ensues.

After the effect of shock is over, in 24 to 44 hours comes the stage of reaction. Inflammation sets in. There is fever. The pulse becomes full, strong and rapid. The internal organs also remaining congested during the shock now exhibit inflammation. Pleurisy, pneumonia, peritonitis or meningitis or duodenal ulcer may supervene according to the parts affected. At this stage the burnt area is likely to become septic and the poisonous products may then get absorbed causing septic fever etc. The sloughs also now begin to separate.

The next stage is that of suppuration on the separation of sloughs. There is greater risk now of the patient succumbing to inflammation of lungs or intestines. Last of all comes the stage of scar formation. Deformity and contraction may ensue.

In the treatment of burns or scalds it should be remembered that the patient's life is in danger from shock if the burn is in any way of an extensive nature. Primary attention should be given to prevention of shock. There is no immediate call for dressing—the heat or charring had made the skin or whatever remains of it, antiseptic, the germs being destroyed.

TREATMENT OF BURNS

The patient should be put between blankets If the clothes are wet, do not mind, put him under blankets, wet clothes and all If the pulse is very weak and if it is possible to arrange for saline infusion, it should be done so that the patient may not immediately succumb Opium is to be given or any hot drink as soon as the patient is able to swallow In cases of slight injury a dose of opiate and hot drink may be enough to get over the shock Treatment for shock is to be continued till there is reaction In the meantime the skin should be attended to For scorches and blisters, air or water or antiseptics cause irritation and pain Carron oil is the thing for the moment It shuts out air and soothes Any bland oil such as cocoanut, sesamum or linseed oil, mixed with equal part of clear lime water (lime shaken with water and allowed to settle) will make carron oil A little turpentine may be added to it with advantage The surface should be wiped free from dirt and adherent matter with carron oil and hot water A piece of clean cloth should be saturated with carron oil and put over the part Blisters are pricked with needle point to allow liquid to be drained off The cuticle is not removed, it forms a protective coat over the raw surface Patients feel comfortable on being saturated with carron oil The wounds should be padded with cotton and lightly bandaged The next day carron oil is replaced with boric ointment The oil should be sterile to begin with For this purpose oil should be previously heated to a point where it

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may hiss on addition of a drop of water and then stored in a corked bottle. When sterile oil is not at hand, it may be made sterile on the spot by heating and allowing to cool and then making carron oil from it. Carron oil should be freshly made every time.

Picric acid in one per cent solution, where available, should be applied over burns. This has a great soothing effect and being antiseptic prevents suppuration.

In burns of the fifth or sixth degree, the patient rarely survives unless the injury is confined to the extremity of a limb. In such a case a surgeon's aid for amputation is necessary. Amputation should be taken up only when the primary shock has been overcome and not before.

When the wounds are drying and when joints are involved, care should be taken to let the joint play, otherwise contraction may permanently make the joint useless.

While accidentally clothes take fire, the immediate help of the persons about would be to make the man lie on ground and roll him in order to extinguish the fire. If thick clothing is available, this should be put over and rolled to smother the fire. Running about is most dangerous as it allows the fire to spread and burn with vigour. If the victim has his presence of mind he should be down at once and roll about to kill the fire. The fire has to be extinguished. If there is water about, it should be splashed.

PREVENTION OF BURNS STING OF INSECTS

Prevention —Care should be taken to prevent burning accidents Children's playing with matches is a fruitful cause. Matches should be hidden away in places inaccessible to children Children should be kept away from naked fires Some cautious mothers take care in covering children in winter Wrappers are rolled over and tied at the back No buttoned coats or frocks are used This is done so that in case of an accident the wrapper may be pulled off easily in case of the child's clothes catching fire Children of poor people warm themselves near open fire in winter mornings and evenings and most cases of burning happen there

Some mothers have the habit of passing a rod through the loop of the two handles of pans used for heating milk and removing the pan containing hot milk The pan is liable to slip and hot milk may be thrown off. A child following the mother, while she is removing the milk pan, runs the risk of getting burnt Mothers should give up this practice for the safety of their children Children suffer severely, become maimed or die after such accidents

Sting of Insect

Insect and Scorpion Bites.—These are wasps, bees, scorpions etc Sting of insects is at first felt as ordinary pin prick but in a few seconds it assumes an agonising form with an extreme burning sensation It seems at that time as if several pins are being

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picked continually Gradually the pain shoots up reaching climax in a few minutes. Sometimes there is local inflammation and the implicated tissues are evidenced by redness in the skin. If the stinging is severe and near a joint then the joint becomes stiff In case a man is stung by a swarm of bees, symptom of severe depression may manifest and the shock may cause death. Application of very dilute acetic acid is the medicine for all sorts of stings of insects It has been found that its application removes pain and burning sensation immediately. If any stinging needles are left on the skin they should be extracted

In cases of severe depression stimulants need be given Hot milk may be given for drink

Some say that saturated (strong) solution of salt put into eyes—two drops in each eye gives relief. Rubbing of the part with cut onions or wet tamarind seeds are also used But in the long run acetic acid crowns all. Where acetic acid is not available, juice squeezed out of lemons, which is citric acid should be used.

Snake-Bites

There are many varieties of snakes and very many of the varieties are of a non-poisonous nature. In cases of bites of snake not known to be non-poisonous, the first thing to be done is to put a ligature on the limb between the heart and the bitten place and as near as possible to the bite. Another ligature

SNAKE-BITES

is to be put at some distance and if possible, a third may be put

The ligature should be tight so as to prevent circulation of blood through arteries and veins. Ligature is to be applied by taking a smooth rope or a piece of cloth rolled like a rope and tightening. The

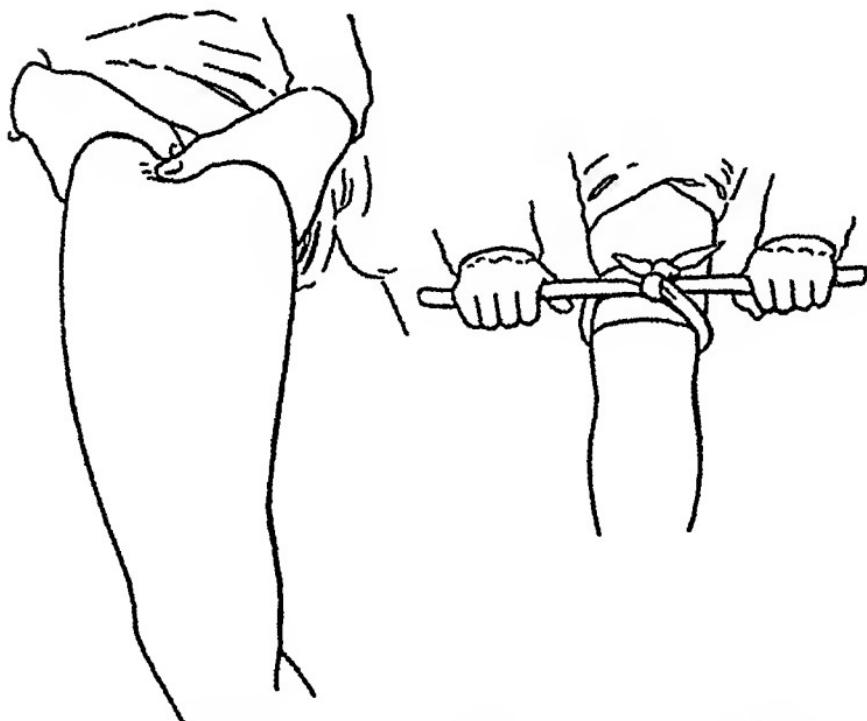


Fig 158. Tightening of ligature by a rod and by manual grip

tightening is done by application of tourniquet A piece of stick or any hard rod is pushed through the tie and twisted This tightens the rope on the muscle and as much pressure can be put in as desired Ligature on the forearm or on leg, however tight may not stop circulation on account of the presence

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of two bones. Therefore ligatures on legs and arms should always be followed by a ligature on the thigh and the upper arm

After a ligature is tightly put, then it is time to enquire about the snake and the nature of the bite. If the snake has been killed and is available, it should be determined whether it is poisonous or not. The

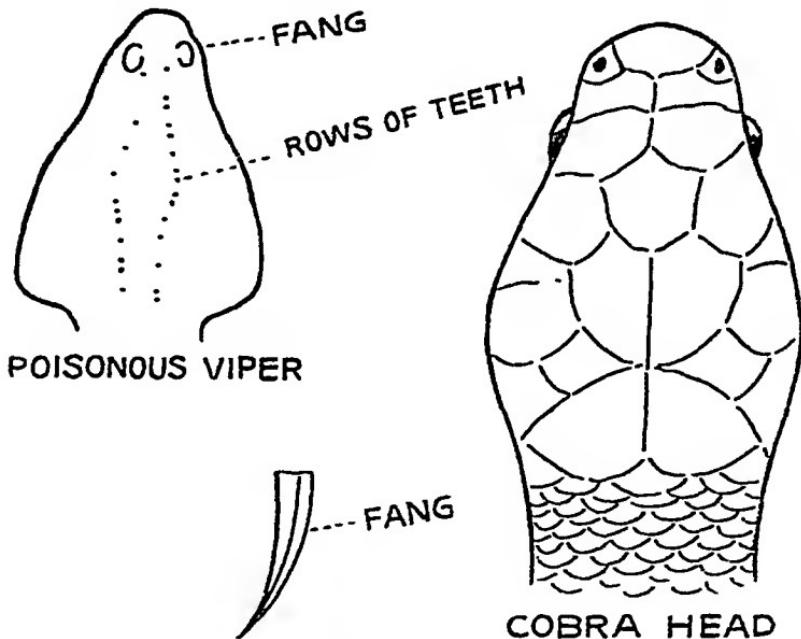


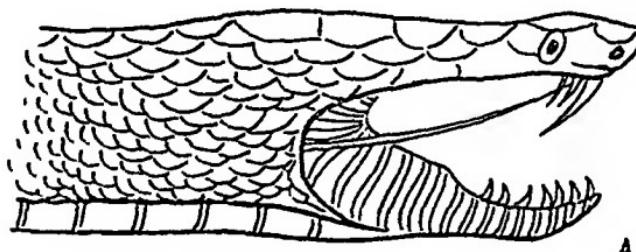
Fig. 154 Heads of colubrine and viperine snakes

poisonous snakes on examination of their teeth reveal two grooved or hollow teeth on the upper jaw. Their bites show two teeth marks like two dots .. placed side by side. If there are several teeth marks, chances are that the snake is of non-poisonous variety but not entirely so. There are vipers of a poisonous nature

COLUBRINE AND VIPERINE SNAKES

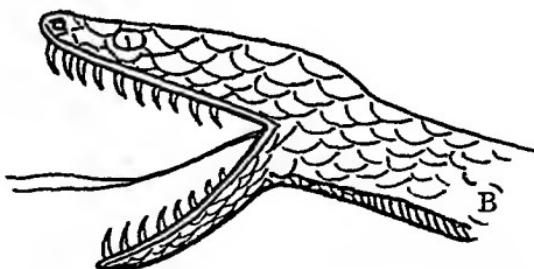
with teeth on the upper jaw whose bite produces several teeth marks. If there is only one tooth mark, it may be from a deadly snake only one tooth of which could reach the site at the time of the bite.

The poisonous snakes are divided into two large classes the colubrine and viperine. The cobra belongs to the colubrine. They have fangs. The



COLUBRINE HEAD

A



B

Fig. 155 (A) Fangs of cobra, (B) Non-poisonous snake

head of the viperine is arrow-shaped with a constriction at neck and has a stumpy tail. Poisons from the two varieties act differently in the system in bringing about death. In colubrine poisoning there is a respiratory failure. If the respiration of the bitten person is getting slower and slower while the pulse is not seriously affected, it should be concluded

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that the case is of colubrine poisoning and is more dangerous than viperine poisoning. If on the other hand, the bitten man has no difficulty of breathing and respiration is normal but the pulse is very weak and feeble and the blood pressure is low, it should be concluded that the man is suffering from viperine poisoning. In viperine poisoning the blood loses its property of coagulation and oozes out from fang marks which also helps to identify the nature of poisoning. In viperine poisoning after surviving two or three days he may succumb to septic inflammation. The cobra ejects enough poison at a single bite to kill 10 persons, so it is very deadly. The viper ejects enough to kill 2 persons and is therefore less deadly. If the full venom has not been injected then there is more chance of recovery after viper bites.

After the ligature has been placed the wound should be incised and potass permanganate crystals dissolved in a little water should be put inside wound. It is a better plan to make more incisions than one in and about the place of bite and allow solution of permanganate to act on these incised surfaces. Permanganate reacts with snake venom and changes venom into a harmless substance. If therefore all the venom has not been absorbed before application of potass permanganate, then whatever is left unabsorbed is destroyed.

The ligature should not be kept upon the muscles indefinitely. After application of potass permanganate and say, after an hour or so from the time of tying

TREATMENT OF SNAKE-BITES

ligatures one of these may be released a little and its effect upon the system observed. Massage should be applied to distribute the solution of potass permanganate at the site of bite. This is more efficacious than the use of crystals in any case.

Another drug for use in snake-bite is acetic acid in dilute form. It has not been examined by the Tropical School of Medicine but some users are confident about its success. In this case the wound is to be incised and dilute acetic acid or vinegar applied in it and bandaged. Acetic acid acts very fast. The time which elapsed between the bite and application of acetic acid is the measure of the time which is required for the patient to get well. Mr C I Greengrass of Madras Presidency applies acetic acid in snake-bites, diluting 1 of strong acid with 11 of water. He has used this in hundreds of cases and has always found it satisfactory. A case of scorpion bite was tested with acetic acid. The man was brought in about 5 minutes after the bite. He was writhing with pain. The great toe was bitten. An incision was made and some black blood came out. Dilute acetic acid was applied soaked in a little cotton in the incision and bandaged. In 5 minutes' time the patient got up and walked away as if nothing had happened.

In insect bite and in stings of bees, acetic acid instantly gives complete relief. The place swells on account of the sting but no pain whatever is felt. This has been the daily experience of bee-keepers who know the use of acetic acid. Citric acid also behaves

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similarly in stings. Whether these are equally efficacious in snake-bite or no, waits scientific experiment in the hands of specialists.

In snake-bites shock is a great factor. Immediately a snake bites a man the victim gets despaired of life. If the snake is a non-poisonous one, its bite cannot kill a man. But a person dies of such bites on account of the shock he receives on knowing that he has been bitten by a snake. In all these cases the



Fig. 156 Compression of the chest (expiration), Silvester's method.

patient should be reassured that nothing serious is going to happen and measures should be taken to allay his fears. Bites in which the poison may not have been enough to kill a man, may prove to be fatal on account of the mental shock, the bite had produced.

Silvester's method of artificial respiration is of special value in colubrine poisoning if respiratory paralysis has not been complete. The patient is laid on his back. The head and shoulders are a

SILVESTER'S METHOD OF ARTIFICIAL RESPIRATION

little raised. The tongue is caught hold of and drawn out. If necessary, it may be kept secured in drawn out position by tying with a piece of thread. In emergency a safety pin may be passed through the tongue for this purpose. The operator stands in the position shown in Fig. 156 and takes hold of the elbows and presses them on the chest. This effects compression. The arms are then slowly extended and taken above the head which effects expansion (Fig. 157) and this is

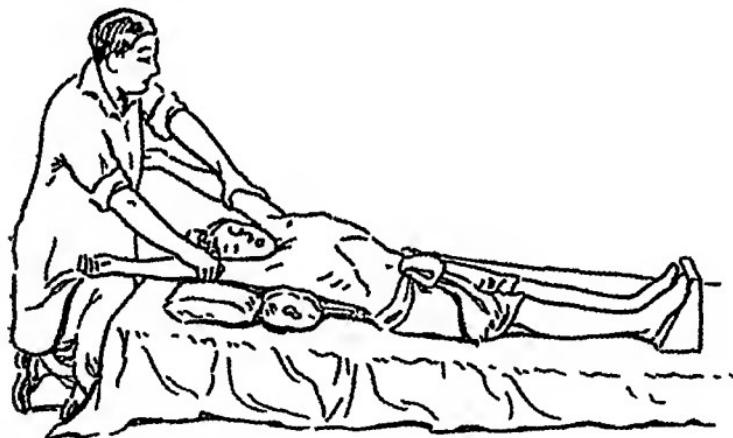


Fig. 157 Expansion of the chest (inspiration), Silvester's method.

repeated. In cases of apparent death from snake-bite the patient should be subjected to artificial respiration. Cases of survival after apparent death are not rare. When the rigor mortis ensues in spite of the artificial respiration then only is the body to be disposed of.

There are only a few snakes which attack a man unprovoked or pursue him to bite. Cases of men found dead in sleep however are not rare.

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Snake-bite cases occur most at night when a man may be walking without a light and by chance pass by a snake or tread on it. In summer months when the snakes are active, it would be advisable to use lights while going outdoors at night. Many snakes will run away at a sound. Clapping of hands or making some other sound will give warning to snakes so that they may not come in the way and cause mischief.

Snakes generally crawl along the floor. If a charpoy is used for sleeping, it will minimise some risk of being bitten by a snake while asleep. Persons in sleep may throw about their limbs and thus may hurt a snake lurking about and get bitten.

The pain of snake-bite is of a stinging character. It may not be severe at first. In course of a few minutes serious symptoms begin to develop. There is a feeling of faintness or drowsiness. The legs lose strength and in some cases respiration becomes short and laboured, in other cases the pulse slows down and becomes feeble. Powers of speech or of swallowing may be lost. Foam appears at mouth corners with saliva. In some cases convulsions set in, in others numbness occurs. The patient becomes insensible and succumbs. In viperine bites the case may be prolonged and poisoning of blood occur. Blood may come out of nose, bowels or gums.

Bites of Animals

Dogs may bite causing a wound. In such a case the wound should be washed, rendered aseptic with

HYDROPHOBIA FOREIGN BODY IN NOSE

iodine and dressed If the dog is mad, the case may turn out to be fatal at any subsequent date Bites from mad jackals are equally dangerous These create hydrophobia, after long periods when death ensues In cases of bites from mad dogs or jackals the best thing would be for the patient to go to the nearest hospital for treating such cases

Wild animals may inflict injuries The injuries may be slight requiring merely antiseptic dressing or the injuries may be deep-seated When severe injuries occur, the first thing would be to stop bleeding (see under bleeding) by applying pressure on the artery concerned The wound should then be thoroughly cleansed and dressed after application of iodine For the inflammation created by such injuries hot or cold poultices should be applied or alternate hot and cold poultice whatever may give relief to the patient

If the pain is unbearable due to mauling, opium should be given and the patient removed to a hospital

In bites or mauling from wild animal, the person generally suffers from shock Treatment for shock should receive precedence next to that of bleeding

Accident from Foreign Bodies in Nose, Ear etc

Foreign Body in the Nose —Seeds and peas or similar small objects may get into the nose. When on attempting to remove, these get pushed further inside,

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it is then that the trouble commences. Very often surrounding mucous membrane gets irritated and exudes fluid which releases grip and the object comes out Peas and similar seeds get swelled and tighten. But this is temporary Peas get softened after swelling and may be thrown out naturally on blowing the nose.

If the unobstructed passage of nose is pressed to stop breath through it and air from the lungs is forcibly blown through the obstruction, the object may come out

A piece of wire bent into a hook at the end may be passed along side the obstruction and then turned and pulled out with the object. Forceps may be used for the same purpose but mostly forceps are found to be unsuitable In the attempt to seize the object the forceps may push it further The object should be pulled out from behind by a loop or hook if possible If leech gets in the nose, salt water should be injected to loosen its grip, after which it will be washed out A syringe may be used and when this is not available, saline water should be sucked in by the nose

Foreign Body in Ear — It has already been mentioned that when insects get in the ear, crawl and cause pain, they should be drowned by pouring in oil at body temperature and then drawn or wiped out For peas, seeds etc which get swelled by contact with water, warm water should be used which should be kept in contact with them for sometime by plugging the orifice so as to fully soften them After softening, the

FOREIGN BODIES IN EAR AND EYE

opening of the ear should point downwards and in this position it should be syringed so that the object may drop off, by the movement of water on account of gravity. If peas have had no time to swell, then oil should be syringed in and not water, so that it may not swell but drop off by the back current.

A wire loop may be used as in the case of nose as also forceps, where the object can be gripped with same precautions as in the case of nose. When these fail the object may be glued to the end of a thin stick. A very stiff and tight swab is made by rolling cotton on a stick as described in the chapter on Nursing. The swab is dipped in thick glue, squeezed to run off extra glue and then pushed into the ear to come in contact with the object, where it is left to dry. After sometime when the glue is dry, the object may be pulled out. In all these operations it should be remembered that at the other end of the passage is the drum, which is a delicate structure and may be easily injured by violent syringing or pushing, resulting in permanent deafness.

Foreign bodies in the eye are to be irrigated out. Water is held in the palm of the hand contracted to form a bowl. Eye is dipped into it and opened and closed. Loose objects, insects etc will get washed out. A piece of sterile rag may be rolled into a fine point at a corner and this may be allowed to play on the object which will adhere to it and thereby get drawn out.

Castor oil is a thick lubricant and is very successfully used when eyes are injured by admission of sharp

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cornered dust or minute objects like coal specks from a passing train. Castor oil then lubricates the objects and the eye by manipulation brings it to a corner to be thrown out. Occasionally the object had got off when the pain was noticed, but the wound continues to irritate and a search reveals nothing. Castor oil is good in such cases. Fresh oil is to be used. Rancid oil gets acid and produces a burning sensation. Iron specks rarely get into the eye except in a smithy. The object if embedded may be drawn off by a magnet of suitable power. Thorny object sticking into the cornea should be loosened with a sterile needle and manipulated out. A magnet is a rare article in village unless kept by the doctor. In the absence of a magnet, dilute copper sulphate solution (3 grains to an ounce) may be dropped into the eye, this will tend to dissolve the iron and make it loose where it may be embedded. The speck then may be washed out.

Foreign Bodies in the Throat :—The head of the patient should be thrown back and the tongue pulled out. Light should be thrown in. This will allow inspection of the position of the object, if near the root of tongue and admit of its being manipulated out or pushed down. Different objects and different position of fixing require different treatment.

If a thorn-like bone of fish is fixed across the gullet, it may be taken out by forceps. If the bone is very thin, it may be loosened by rubbing with finger to which some jute fibres are wrapped." By

FOREIGN BODIES IN THE THROAT AND TRACHEA

chance the thorny thing may get entangled with jute fibres and come out with the finger

If the object goes too far down the throat, attempts should be made to throw it out by vomiting Any suitable emetic such as dilute copper sulphate or strong saline solution may be used Failing these methods the object should be pushed down by a swab attached to the end of a flexible stick or cane. If the object is pushed down the patient should be kept on soft food without much water Hard lump may then form round the object which may pass out without injuring the gut Purgatives thin down stool and thereby expose the object to abrade with the intestinal walls If a leech is swallowed, salt water should be taken so that it may die or come out with vomitus

Foreign Bodies in Private Parts :—If the objects are of such a nature that they can be felt by finger, then forceps should be used to pull them out If an object is beyond reach and has entered the uterus, the patient should be taken to a surgeon for operation. If a leech gets in, solution of salt should be injected in by a syringe which will looser its grip and also wash it out

Foreign Body in the Trachea —It may cause great distress and suffocate As in the case of throat, the position should be determined and the object manipulated out by finger If this is not possible, a hook is to be slid past the obstruction and the object pulled out The patient may be helped with

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artificial respiration if there is breathing difficulty on account of obstruction, while attempts be made to pull up the obstruction

Vomiting relaxes the muscular tissues For obstruction in trachea vomiting may be useful in making the grip loose and in introducing wire hook beyond the object.

Needle under the skin should be taken out quickly by an incision at the point of entrance and pulling out with forceps. Needles may penetrate and leave the place after sometime, so that the position should be determined first before an incision is made

Bleeding

Bleeding has to be stopped and next aseptic surrounding should be ensured The body holds at any moment only 10 to 15 lbs of blood in all This is distributed all over the tissues. If at any moment there is excess or diminution of blood then there is a corresponding rise or fall of blood pressure This phenomenon has been described in connection with blood pressure in the chapter on Human Body.

If therefore there is a loss of blood due to bleeding from any cause, blood pressure will fall. If the bleeding is rapid, the effect is marked. In slow bleeding the effect is less marked

When the blood is rapidly poured out of a large artery the patient may die in a few minutes of syncope When however the bleeding is less severe,

BLEEDING

the face and body become white and cold and the lips pale. The pulse becomes feeble and rapid and then almost imperceptible. The skin is bathed in perspiration, the respiration becomes of the nature of a sigh, the sight gets dimmed and thoughts get confused. Graver symptoms may follow ending in swooning and then death. The patient may slowly recover from any of these stages.

Children bear the loss of blood badly but recover quickly and completely. On the other hand, old people stand the loss of blood better but permanent injury is likely to follow. In slight but continued bleeding such as in piles, the patient becomes anaemic and is quickly exhausted and may have oedema of ankles and legs.

Blood is a good culture ground for bacteria. If clotted blood is allowed to remain on wound with continual slight oozing so that the clot may not dry up, sepsis quickly follows. During menstrual period there is a chance of injurious bacteria finding lodgement if diapers are unclean. In attempts at suicide or in accidents men left seriously injured may be found with bleeding stopped but having serious exhaustion and also septicemia. If exhaustion is got over, septicemia takes the toll.

Considerable loss of blood diminishes blood pressure which means less flow of blood everywhere and consequently also to brain. Diminished circulation of blood to brain will cause fainting which may terminate fatally if sufficiently serious. Even in case diminished flow there should be an attempt to send

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more blood to the brain. In a case of bleeding, the patient should lie down so that more blood may flow into brain and if signs of faintness appear the head should be lowered for helping blood to flow into brain by gravitation. Raising the foot of the bed or raising the patient's feet considerably, will help sending some more blood into brain and get over an emergency. As a general rule, a bleeding limb or part should be kept in a position higher than that of the heart.

When bleeding is from a wound, blood may be flowing from an artery or a capillary or a vein. The flow depends upon the pressure with which blood is fed at the point. A wound in which a deep-seated artery is cut may show blood coming out oozing on account of the pressure of muscles, whereas the same cut from a superficial artery will make a flow in jets.

In order to stop bleeding, pressure is to be applied on the point. Pressure may be applied by a tight bandage. When this is not enough, pressure will have to be applied by pressing the point with the thumb or the fingers. If pressure at site is not enough or if it cannot be conveniently applied, then pressure will have to be put on the artery a little further up. Pressure points for arteries are shown in Fig. 159. Pressure may be applied there with the thumb or with the fingers. If this is not enough, then a tourniquet will have to be applied on the pressure point of artery. For this purpose a piece of smooth hard substance has to be put on the spot above the artery and tourniquet applied. Where no

BLEEDING

suitable hard substance is available, a knot may be made on a piece of cloth and the rounded surface put against the pressure point. By so doing, the arterial blood ceases to flow but side circulation is maintained

Even if pressure so applied will not stop bleeding, then the artery is to be searched for in the wound. On discovering the cut end of the artery a sterile needle is to be pushed into the artery end which may then be pulled out a little. The protruding end is then tied by a knot of a sterile piece of thread. On

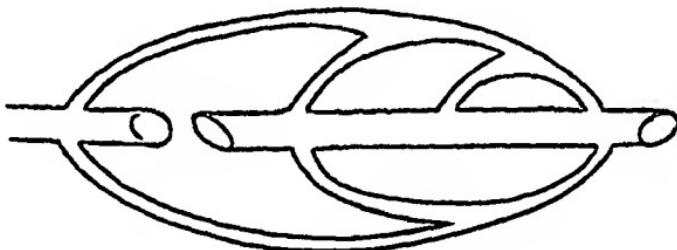


Fig 158 By-passes of an artery

being kept bandaged the ligatured end will come out with slough and the wound will then heal. When an artery is thus blinded and ligatured, the circulation is not disturbed long. The by-passes are then enlarged and the flow of blood continues as before.

Another method of stopping a bleeding wound when pressure on the artery fails is to put cone-shaped rolls of bandage on the wound and dress the wound tight. If one cone is not enough, another is added and bandaged. These rolls put inside the

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wound press against the sides and thereby compress the artery, stopping bleeding.

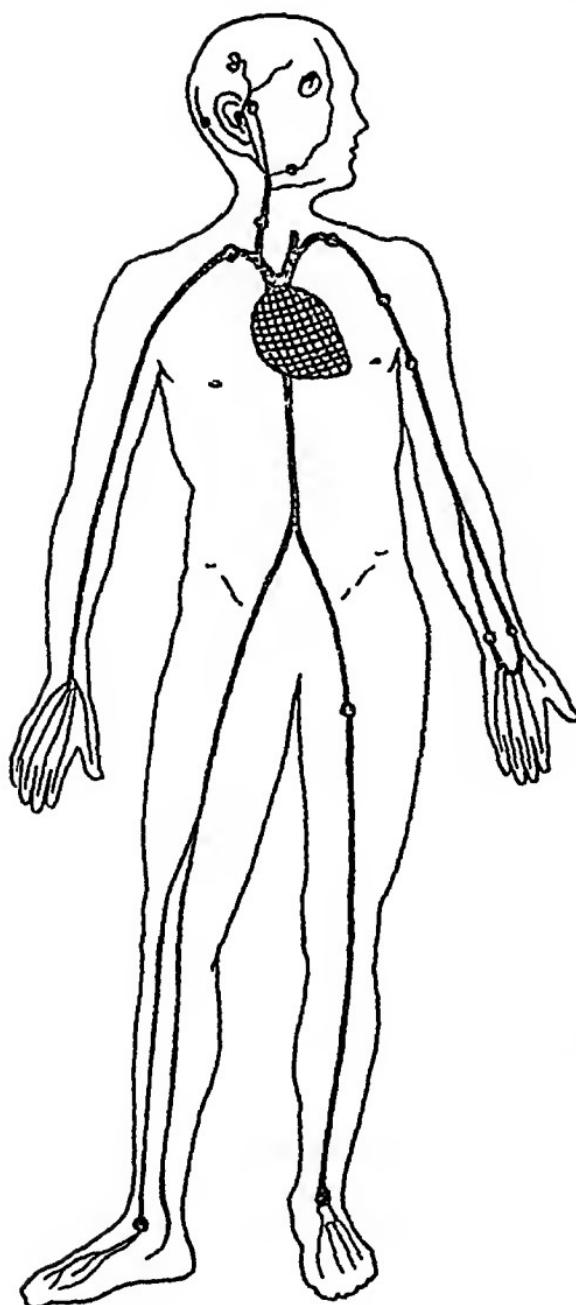
Where a tourniquet is applied it should be gradually relaxed observing its effects on the wound. It has to be released in about half an hour. If the tourniquet is not removed then circulation of blood may be stopped for the limb with disastrous results.

Very cold and very hot application stops bleeding. It should be tried. If blood itself acting as a styptic by coagulation, does not serve the purpose, then it is that a serious situation has to be faced.

For external wounds styptics are sometimes useful. Alum is one. There are many herbs with well known styptic properties. These herbs have various names in different varieties and are used at different areas. The local styptic plants should be sought for and its claims tested and one chosen for use in emergencies.

Internal bleeding from accidents or blows are always serious. Internal blood comes out through nose and through lungs by mouth or it may find exit through urine and stool. Internal bleeding is always serious and internally styptics are of little use. Turpentine in 5 minims doses may be tried as an internal styptic. When the bleeding is from an artery the blood is red and when from a vein it is blue. Venous bleeding is to be stopped in the same way as arterial bleeding. Only the pressure should be put beyond the wound whereas in arterial

PRESSURE POINTS IN BLEEDING



bleeding, pressure should be put between the wound and the heart

Some points for applying pressure to bleeding arteries are indicated in the sketch

Proper care should be taken about asepsis. Hands and instruments must be thoroughly sterilised before using. For general treatment medicines which have power to stop haemorrhage and astringents should be given

Fig. 159

Broad lines indicate the course of arteries and the dots pressure points.

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Alum solution is used in bandaging for its astringent action. Turpentine should be given internally in 5 minim doses

Bleeding from Palm or Fingers.— Pressure should be put on radial and ulnar arteries. Radial artery is the one on which we generally feel the pulse. Ulnar artery is opposite to it.

For Bleeding From Wrist:—Pressure should be

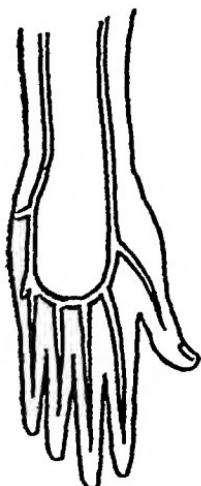


Fig. 160.
Branches of
radial and ulnar
arteries.



Fig. 161
Brachial
artery.

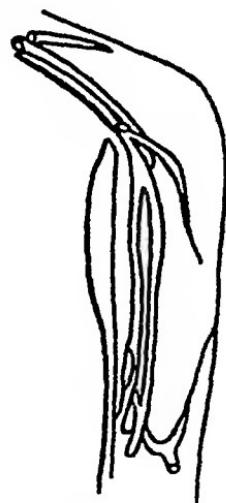


Fig. 162.
Subclavian artery

applied on the brachial artery which is just behind the prominent muscle of the upper arm known as biceps

For Bleeding from Armpit:— Pressure should be applied on the subclavian artery. This is at a place just below the collar bone.

For bleeding from the head or inside the brain pressure should be applied on the carotid artery.

INJURIES OF BONES AND JOINTS • FRACTURE

This pulsates on the neck and we can feel it In debilitated persons it is often visible

For Bleeding from any Foot —A tourniquet should be applied on the thigh as the artery there is very deep-seated In case of bleeding from the thigh pressure should be given just on the loins

Injuries of Bones and Joints Fracture

Fracture of bone is a sudden disruption of the continuity in the bone either from direct or indirect violence from exterior or from severe muscular action When the skin covering the bone remains unbroken it is called a simple fracture, while when a wound is inflicted in such a way as to create a communication between the site of fracture and external air it is called a compound fracture

According to the extent of fracture it may be complete when the bone is broken quite across, incomplete or greenstick when partially broken and partially bent specially in children and multiple when two or more distinct fractures occur in the same bone or different bones In comminuted fracture the bone is broken into several pieces at the site



Fig 163.
Carotid artery

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Examination of a Fracture.— Before examining a fracture the cause should be ascertained, for then much may be known about the nature of the injury. Surrounding clothes should be removed with delicate care. Unnecessary movement should not be made of the fractured limb as sometimes it may lead to further damage.

General Signs of Fracture.— Pain, swelling, impairment or loss of function, loss of mobility and alteration of the shape are the accompanying signs of fracture. Shortening of the limb may also be present. Crepitations are felt when injured parts are moved and rubbed. Shock may or may not be present according to the severity of the case.

Diagnosis of fracture becomes difficult when the swelling is profuse, when the bleeding inside is profuse, or when it involves a joint or when a fracture is deep.

Treatment of Fractures in General.— The indications of treatment are to reduce the fracture by placing the fragmented parts in apposition so as to restore the normal shape and to keep the part in position by use of splints till a firm union is ensured.

Articles Generally Used to Treat Cases of fracture.— Splints, bandages, pads and ordinary sterilised boric ointments. Splints should be made from thin pieces of bamboo. Bamboo may be made into splinters and shaved clean. Thickness may be adjusted according to the strength needed.

TREATMENT OF FRACTURES SETTING OF BONES

When adjusting splints care should be taken that no undue pressure or force is applied, otherwise there is chance of making a simple fracture into a compound or multiple one. Before bandaging pads have to be used which should be made to fit the depressions and prominence of the affected part. Cotton rolled in cloth and flattened to shape will make pads. Before applying splints the limb should be carefully cleansed. The splints are to be padded also.

Reduction of fracture or setting of the bone should be done as early as possible after the injury had taken place. Sometimes a strong fixation board may not be available immediately. In such cases—as in case of lower extremity, the injured limb may be bound to a sound one. In cases of emergency, walking stick or umbrella may also be used. A fractured upper limb may be secured with the body trunk. The system tries to join up fractures without the least delay. Immediately after the fracture there is swelling and inflammation and in 24 hours nature acts about repairing the break. If the bones are not properly placed in normal position, the formation of union will not be hampered thereby and misplaced bones will begin to be joined. Repairing of broken part is thus an acute natural process. This makes the matter of proper setting immediately after fracture, a thing of great importance.

If a broken bone is pushed inside another it is called an impacted fracture, if a broken fragment is pushed along side another into the muscle it is

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fissured and when a portion is clipped off it is called splintered. In all these cases the bones will join up but normal working would be impossible.

The broken parts should be placed in normal position by feeling, by pulling or rotating according to the nature of the injury. The set of bones should now be secured in position by placing padded splints against the limb and fixing the splints. The splints should, wherever possible extend beyond joints either way. In simple fracture the broken portion of the limb should be kept unbandaged as far as possible. The splint will be fixed above and below. This will allow of examination of the part without disturbance and air and sun will be allowed to play on the skin. A mud plaster may be applied on the site to promote healing in case of simple fracture. If the fracture is to be bandaged, it should be done lightly so as to disturb circulation the least. If there is swelling, the bandage should be adapted to it.

Joints involved should be given passive movement. The patient himself performing it with the help of his sound hand or some one to assist and move the limb. The general health of the patient should not be neglected, sedatives in the form of opium may be necessary to relieve pain and induce sleep in the very first stage.

Reduction of fracture with profuse swelling or extravasation of blood should not be undertaken immediately. The swelling should be treated with cold application like mud poultice to reduce the

TREATMENT OF FRACTURES FRACTURE OF CLAVICLE

inflammation and then care should be taken that the affected limb remains in normal state so far as it can be arranged. Occasionally it may be necessary to keep the fragments in position by applying a continual traction or pull on the lower portion and an opposite pull on the upper portion. This can be best accomplished by tying weights with strings passing over the chair-poy and fixed to the limb.

In dealing with compound fracture, keen attention should be paid for ensuring antisepsis. Such cases should be given first aid and then sent to the nearest hospital for treatment, if possible. In many cases of compound fractures where laceration of the skin is great or there is grinding of bone or where main arteries are torn, amputation of the part is the only means to save the patient's life. Exposed bones are very much liable to sepsis. They should be guarded by antiseptic dressings or if possible should be pushed inside the skin after strong antiseptic washes. If the broken fragment is loose and simply hanging by the skin it should be cut, removed and the end bandaged with proper dressings.

Fracture of the collar bone or clavicle may be a result of direct violence from fall or *lath* blows or a result of a fall on palms or shoulders. It is generally broken in the middle. The patient cannot raise the arm upwards towards the head, the broken part may be seen and felt to be prominent. The affected shoulder looks more flat and falls forwards and inwards. The patient supports his elbow with

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the sound hand and he inclines his head to the fractured side to relax the muscle joining the sternum with the bone gliding over the clavicle.

Treatment.—Place a big cone-shaped pad under the affected armpit. Fold the patient's arm at elbow and firmly secure it in position by tying it up with the upper arm with a bandage. Draw the arm now well backwards and tightly bandage it with the trunk so that it may not come forwards. Take care that the elbow may not slip forward. By pressure of arm with the body the conical pad will remain in the armpit. Support the forearm from the neck with a sling. The hand should be in perfect rest till complete union takes place.

If there is any possibility of moving the forearm, place it on the chest, the palm remaining over the opposite nipple and a bandage should be applied in such a way as to keep the forearm *in situ* firmly. Apply cold compress over the affected part for a few days replacing it by anodyne liniments, later massage. It may take four weeks before arm can be allowed out of the sling or bandage.

Fracture of the Humerus:—Humerus may be fractured in three places, at the upper end, middle and at the lower end.

Fracture of the upper end of humerus is generally due to direct violence and manifested by loss of rotation of the shoulder, slight shortening of the arm and protuberance of the fractured bone in front of

FRACTURE OF THE HUMERUS

armpit. The round head of the bone may be felt at its right place.

Treatment — Set the bones in apposition by traction at the elbow joint. See that it is set right there by feeling with hand. Flex the elbow and draw the palm of the flexed forearm to go up to the opposite shoulder. Fix it there by tying the wrist and bandaging it with the shoulder. The elbow must now hang freely so that this will put the necessary

pull or extension. See that the elbow may not be raised from the body. A light bandage may be fastened for the purpose. Patient should take rest in recumbent position. Begin massage after 4 or 5 days and after a week or more try passive movements.



Fig 164
Bandaging fracture of the
humerus.

In fracture of the shaft of the humerus the bone is divided transversely. Displacement is not so marked as in horizontal fracture.

Pain, impaired mobility, deformity, shortening of the arm are the accompanying symptoms. Crepitus is readily obtained by moving the fractured parts.

Union takes place as usual but it is one of the most common situations of ununited fractures.

Treatment — Take a splint 3 inches in width and sufficiently long to cover the elbow joint. Another

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smaller and thinner than this should be taken to pad them well. Set the bones after pulling. Now secure the injured part between these splints and firmly fix them by bandaging. Take two splints more long enough to measure from elbow joint to the palm. Pad them well and secure the forearm also at right angles with the upper arm with the palm vertical.

Keep these splints for six weeks. Begin massage after a time keeping the splints lightly tied and only removing the bandage.

Fracture of the lower end of humerus :—The

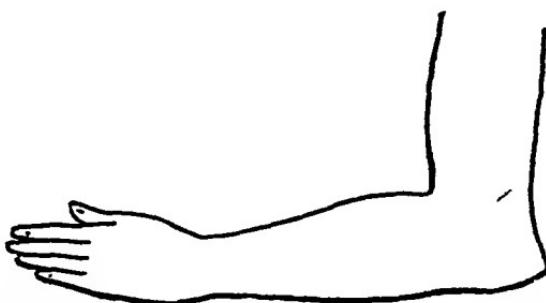


Fig. 165. Fracture of the lower end of humerus

forearm is shortened and bent more or less at right angles to the arm ; the posterior elbow joint projects posteriorly and the lower end of the upper fragment forms a prominence in the front of the joint. The signs are similar to those of dislocation of the radius and ulna backwards.

Treatment .—Flex the forearm at acute angle and keep it thus flexed by fixing the hand to the opposite shoulder. In many cases no splint is required. If splint fixation is required it should be done.

COLLE'S FRACTURE

Generally these cases cause permanent disfigurement. To avoid this the injured portion must be seen daily and massage commenced as soon as possible. Passive movement or moving the arm with the help of the other hand may be commenced after a week.

Fracture of the prominence of the arm bone and fracture of the prominence of the elbow can be diagnosed by feeling of crepitations produced by rubbing of fragmented bones.

They should be secured by short angular splints on both sides and the forearm should be turned face downwards.



Fig. 168 Colle's fracture.

Fracture of the radius and ulna of the forearm — The commonest fracture is a fracture near the wrist. In some cases both bones may be involved. Unless properly treated it is sure to leave some deformity of the wrist joint.

Fracture of Lower end of Radius (colle's fracture) — It is manifested by a transverse fracture, rotation of the lower end of the radius backwards, a deviation of the hand towards the radial side and rupture of the internal lateral ligament. There is complete loss of pronation and supination and also deformity.

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Treatment:—Produce one splint long enough to measure from elbow joint to the root of the fingers and another smaller than this. The bigger one should be at least 3 inches in width and the upper one should be not less than 2 inches. Pad these splints thoroughly so that no gaps remain when the arm will be placed on them. Now hold firmly the patient's hand (like

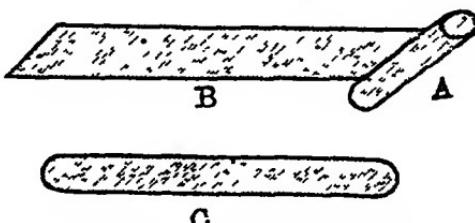


Fig. 167. Carr's splints.

A. Round wood, B. Flat splint, C. Covering splint.

shaking hands) with one hand and the upper part of the forearm with the other. Give forcible traction to set the bone in right position.

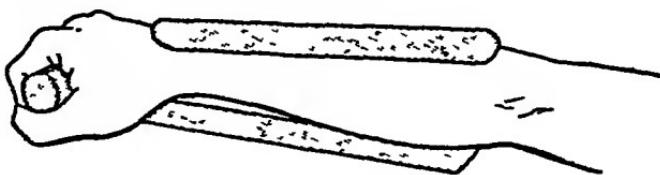


Fig 168 Application of carr's splints.

Traction must be steady and deviated well towards the ulnar side. After reduction is complete, put the hand on the well-padded splint. Now the patient should hold in a grip a piece of round wood and this should be bandaged with the cover splint keeping the hand as it was during traction, deviated towards

FRACTURE OF METACARPAL BONES

ulna. Put a sling from the neck to support the forearm at right angles

The patient should move the fingers whenever opportunity occurs and begin massaging soon after the joint is strong. Any oedematous swelling of the palm or fingers should at once be followed by loosening the bandage. Care should be taken not to let the traction go. It will cause deformity. Passive movement may be commenced after 2 or 3 weeks but a wrist-strap must be maintained till the wrist is strong enough to resume normal work.

Above splints may be removed after a week replacing by two ordinary broad splints of length from mid-forearm to the root of the fingers

Unless these points are carefully looked after deformity and stiffness may result

Fracture of the Metacarpal Bones —It is often associated with extravasation of blood and in these cases treatment should first be directed towards the swelling. Cold application in the form of mud poultice is of much benefit in reducing such swellings. Only when any subcutaneous vein ruptures, it may be necessary to draw out blood by slight incisions.

Take a thin piece of wood or flattened bamboo measuring from palm up to the lower third of the forearm. Another piece may be a little shorter. Pad these very well and after setting of the bone by extension, fix the palm with a bandage. Same care should be taken as in fracture of forearm at wrist.

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For Fracture of Finger Bones :—Set the bones Fix them between two pieces of small finger-like splints, one of them long enough to go up to the wrist. Apply finger bandage first fixing it with palm by figure of eight round the wrist. Support the hand by a sling from the neck, a little above the elbow joint

Fracture in the upper Part of the Thigh or Femur :—The commonest type of it is manifested by a slight shortening of the limb by about an inch. The leg is drawn backward and upward. Local protuberance of the upper fragment forward is well marked. The toes are turned out and the heel of the injured limb points to the instep of the sound one. Take careful measurement of both the limbs with a tape before and after reduction of broken part. It is absolutely necessary to ascertain the amount of over-lapping of the broken fragments and see how far it is reduced. The points from which measurement is to be taken



Fig. 169.
Fracture of the femur.

TREATMENT OF FRACTURE OF FEMUR

are the anterior superior spine of the hip-bone and ankle joints

Treatment — Take a splint long enough to measure from an inch below the armpit to six inches beyond the heel. The lower end or the foot end should be furrowed and have a hole in it (Fig 170) The width of the splint should be about four inches



Fig. 170 A long splint

Two pieces of flat bamboo battens tied side by side may do

Reduction of the bone should be done by traction, if necessary and should be maintained till the bandaging is finished The splint, well-padded specially on those

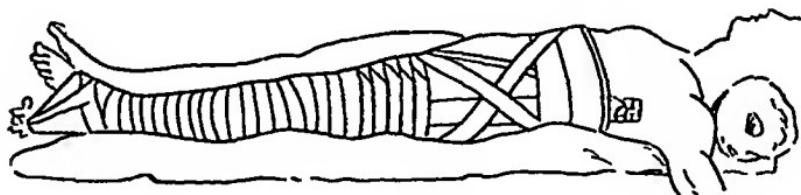


Fig 171 Bandaging fracture of femur with long splint

parts which touch bony protuberances, is first bound to the foot and by a bandage carried through the notches of the splint and over the ankle Then proceed up the leg beyond the knee to prevent relaxation of the ligaments of the joints Go on now bandaging over the thigh tightly to fix the affected

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bone well with the splint. One or two straps are put around the chest in figure of eight and then plainly with the chest and splint. Proper padding may be given over the chest through which the bandage passes.

Extension is the next important thing to apply. Extension is essential to avert the shortening of the limb. As soon as the bandaging is finished, a strong tie may be passed through the lower pole and hanged down the cot with some weight on it. There is a chance of the patient slipping down with the extension. It is better to apply continuous traction by means of a weight tied to the foot. The weight should be increased till by measurement, the limbs are equal.

Fix an ordinary thick piece of wood at the end of the cot with a hole in it at the top. Through this hole passes the traction rope.

This position must be maintained for 6 weeks or more. The limb should be massaged as often as possible.

In case of the fracture of lower end of femur, massage and passive movement should be begun early after setting. Some prefer to keep the leg in a semi-flexed position when a union of bone by first intention is complete. Long splints may be then removed and replaced by short splints covering from lower third of the thigh to the ankle. Semi-flexed position may be maintained by supports.

FRACTURE OF PATELLA

Fracture of the Knee-Cap or Patella —A sudden severe muscular action or fall on knee is the usual reason for patella fracture. A sharp pain is experienced accompanied by a crack or snap. The patient cannot stand or extend the knee. Patella is almost a flat round bone. When due to muscular

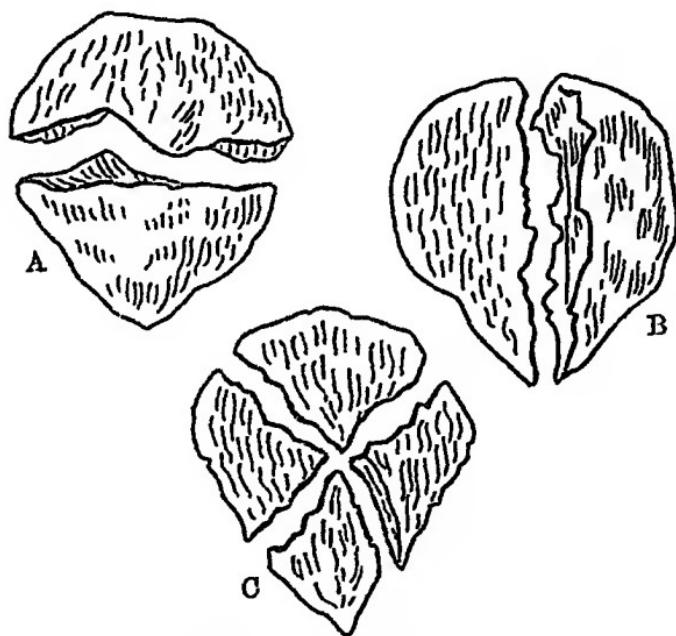


Fig 172. A Transverse, B Vertical, C. Starred fracture of patella
action the fracture is transverse and when a fall causes it, the fracture is either starred or vertical

Splint and strap method should be adopted as follows. Lay the patient on bed. Well pad the splint and put the patient's leg on it, the ankle at the angular end and buttock on the end opposite. Now raise the angular end to a foot above the level of

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the bed and support by a pillow By this the broken parts will be loosened and fragments allowed to meet each other

Now apply a bandage in figure of eight from round the knee, the crossing being either behind the knee or at a side according to the nature of the fracture. This being done, fix the splint with the leg by proper bandaging

Keep the bandage for a month and a half after which it may be replaced by strong leather or broad

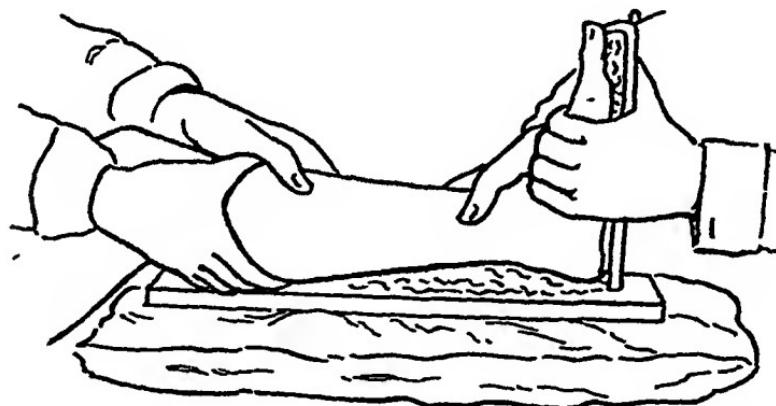


Fig. 178 Bandaging fracture of leg bones with splints.

bandaging The patient should not be allowed to exert the knee actively within 2 months Fractured knee-cap often does not readily form a whole joint Fixing of bones by means of wires may be necessary Where the broken cap is simply kept in position by muscles the knee will be unworkable

Fracture of the Leg —The management of this fracture is similar to the case of patella fracture

FRACTURE OF FOOT, LEG BONES, RIBS POTT'S FRACTURE

The length of the lower splint should be up to the back of the knee. The leg is supported on a well-padded splint and then bandaged all round with a thin padded splint or a strong padded board placed over the skin Fig 172. The bandage should be firm, care being taken to pad the leg well for free circulation of blood.

Fracture of Foot and of Leg immediately above the Ankle :— First set the bones right by extension,

if necessary. Then support the foot in between two padded angular splints. And then place a third splint flat below the foot and secure all the splints tightly. These splints should occasionally be removed for massage and passive movement commenced after 5 or 6 weeks.

Complete fracture of the bone just above the ankle appears in the sketch.

These fractures also should be dressed with two angular splints.

When these fractures are associated with dislocation of the foot at the ankle it is called a Pott's fracture. Both of them are alike. The management after reduction is also quite similar. Care should be taken to remove the splints occasionally for massage.

Fracture of the Ribs — External violence is the general cause of rib fracture which may be direct or

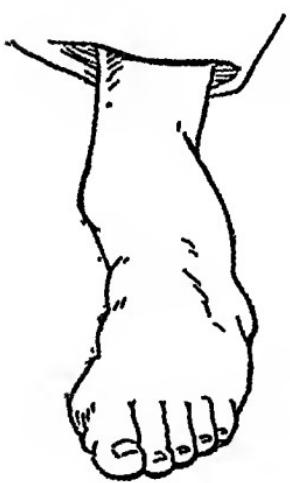


Fig 174.

Fracture of leg bones
above ankle

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indirect From direct violence it is generally broken at the site of injury. From indirect violence as from crushing pressure of a crowd, the seat of fracture is at the middle of the bone i. e , at its most convex parts Several bones may be broken both from direct or indirect violence. Sharp pain on coughing and grating sensation at the side are the prominent symptoms The principal trouble with such fractures is that pleura or lung may be injured and ultimately cause haemoptysis, pleurisy, pneumonia etc On passing a finger over a rib, a distinct depression may be felt, the patient complaining of severe pain on the least amount of pressure.

Treatment :— Complete rest in bed is to be secured. Apply a broad roller bandage about 8 inches in width over the chest from the armpit to the stomach tightly. Secure this in position by stitching some shoulder straps Sand bag on the affected side may be placed. This hampers movement of the broken rib which is so essential for union of broken parts Bowels must be kept open by enema. Nothing should be given by mouth except liquid food. Pain, coughing or haemoptysis should be treated as the symptom arises. If pleurisy and pneumothorax result, they should be treated.

Fracture of the Skull :— Fracture of the skull is always due to severe direct violence and every case of fracture is associated with either compression or concussion of the brain apart from the external injuries Nothing special need be done to set the fractured ends

FRACTURE OF THE SKULL AND SPINE

but to leave them as they are and attend to the local wound and brain symptoms Perfect rest, confinement in a dark room, liquid low diet, cold lotions on head, abstinence from all stimulants and cleaning of the bowels are the steps to be taken next

Fracture of the Spine —Spinal fracture is always associated with dislocation of bone or part of a bone and may be caused by direct or indirect violence

Local signs are often but little marked There may be pain at the seat of injury with some swelling or some inequality in the spinous processes The symptoms are often general in accordance with the nature of injury sustained by the spinal cord and also according to the seat of the injury

If the fracture injures the medulla and is situated anywhere above the 4th cervical vertebra, death is instantaneous

A little below that, if death is not instantaneous the patient may survive from 12 hours to 2 or 3 days Usually however death takes place in about 24 hours

In the upper dorsal region the patient may linger for 2 to 3 weeks. The primary symptoms being paralysis of chest muscles and difficulty of breathing Later, death results due to suffocation from congestion of the lungs

In the lower dorsal region, if the patient survives the period at which inflammatory troubles commonly occur, he may recover or undergo gradual improvement in the course of time remaining however paralytic

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In the lumbar region the patient may recover with perhaps partial paralysis of one or other of the lower limbs or of a certain group of muscles or even without any paralysis whatsoever

Treatment — See that the patient is comfortably placed. In cases where there is no paralysis, showing that the cord is not affected, keep the fractured spine at perfect rest both for union of the fractured ends and to prevent injury to the cord from displacement of fragments by movement. In cases where the power of micturition is lost, evacuate the bladder twice daily with a sterilised catheter

Practically there is no medicine which can be successfully tried internally except occasional purgatives. Iodine 3 minims in an ounce of water and chota chandra in 30 grains doses may be given.

Fracture of the Nasal Bones. — It is a result of a blow or a fall. Fracture of the nose is manifested by a typical flattening of the nose associated with bleeding. Try to check the bleeding early. In severe cases it may require removal of some nasal bones which should be left for a surgeon to be done. Application of cold water, mud poultice and tight bandaging may go a great way towards stopping bleeding. Bridge of the nose may be depressed. It should at once be reduced. The operation is simple. Put a dressing forceps or a thermometer case inside the nose. A slight tilting movement and pressure will correct the depression.

FRACTURE OF THE JAW BONE DISLOCATIONS

Fracture of the Jaw Bone —It generally occurs as a result of fall on the chin. The common forms may be distinguished by pain which increases on moving the jaw, dribbling of blood-stained saliva, some irregularity on the line of teeth, unnatural mobility of fragments, crepitus and a rent in the mucous membrane over the fracture.

The parts should be placed in apposition by pressure from both sides and supported by a four-tailed bandage. No solid food should be given to chew for 4 to 5 weeks. All movements of the jaw must be avoided. Mouth should be frequently washed by douche. Liquid food should be given with a tube passed up to the last molar teeth.

Crushing of Hand —When the hand is crushed, cold poultice should be applied first. When the swelling is gone then the bones should be set properly and bandaged.



Fig. 175
Four-tailed bandage applied
for fracture of chin

Dislocations

A dislocation is the forcible displacement of the articular end of a bone from the part with which it is naturally in contact.

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The common signs of dislocation are : Alteration in the shape of the joint, inability to move the joint and more or less fixity. An abnormal position of the end of the displaced bone, shortening or lengthening of the limb. Pain is always an accompanying symptom with swelling.

For treatment place the dislocated portion in its normal position.

In recent cases the following situation may be observed :

The muscles surrounding the joint are contracted, the points of bone are hitched on each other and ligaments, tendons or muscles are interposed

In Old-standing Cases — Adhesions are formed around the displaced bone, ligaments and muscles are permanently shortened and the shape of the articular surfaces is altered.

Treatment of dislocation is effected by manipulation. Dislocated bones should be reduced or returned to their normal state early. It must be borne in mind that time lost in treatment makes the case more difficult and complicated. Most of the dislocations may be readily returned into place by pulling the limb and manipulation. But some may require the use of anæsthetics to reduce the dislocations. Opium may be given to numb sensation and then reduction may be undertaken. After reduction the part should be well secured by bandage and rest should be given for some days or weeks as the case may require

DISLOCATION OF LOWER JAW

Dislocation of the Lower Jaw — This may be caused by a blow upon the chin or by trying to introduce large objects into the mouth or from spasmodic action of the muscles as when a man yawns. It is frequent in weak or debilitated persons and in old age. The mouth is widely open and cannot be shut by voluntary action. Saliva constantly



Fig 176 Dislocation of the lower jaw

drizzles away. The lower set of teeth will be found projected forwards more than the upper set. Speech is hardly possible.

Dislocation of lower jaw is easy to reduce if treated immediately after the occurrence. Make the patient sit on a chair and have the head held firmly in position. Wrap both your thumbs with some

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cloth and place them, the right thumb on the left side and left thumb on the right side on the last molar teeth of the patient Hold with other fingers the outer and front part of the jaw Now give a downward and backward pressure with thumbs. The bone will go in its place with a snap. Secure it with a four-tailed bandage for a few days. The patient should be warned not to yawn widely

Dislocation of Collar Bone.—The dislocated collar bone may be felt as a protrusion over the upper part of the breast bone The arm cannot be raised

Pressure required to place it *in situ* is outwards. backwards and upwards Stand behind the patient Place your knee on the spine of the patient opposite the dislocation and then holding the shoulder draw it backwards and outwards, giving at the same time a upward pressure with the thumb at the dislocated end of the bone The bone goes to its place with a snap Secure it with a pad by a shoulder bandage with chest for 2 weeks Perfect rest of the arm should be ensured

Dislocation of Shoulder Joint.—The joint being rather loose and having a very wide sphere of movement, easily dislocates.

There are many varieties, the commonest being dislocation inside. The head of the humerus slips by the side of the socket (glenoid cavity) or below the socket into the armpit. The length of the arm is

REDUCING DISLOCATION OF SHOULDER JOINT

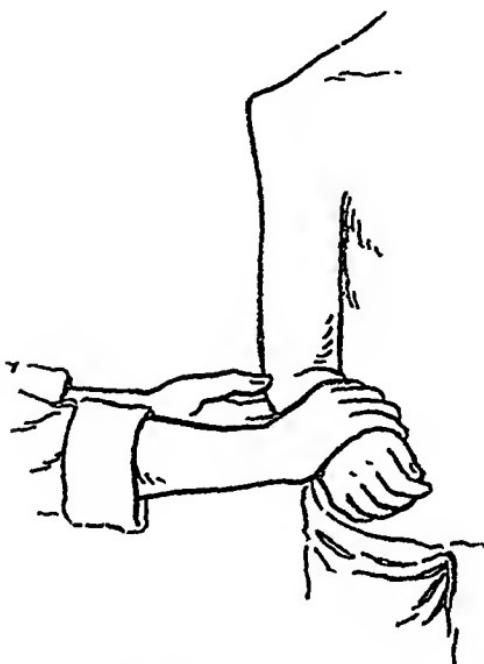


Fig. 177 Flexing the elbow (Kocker's method)



Fig. 178 Arm abducted and rotated outwards.

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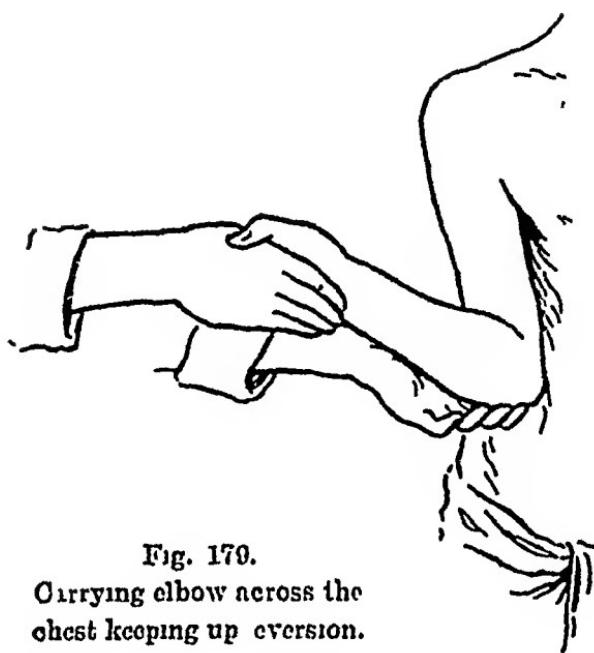


Fig. 179.
Carrying elbow across the
chest keeping up eversion.

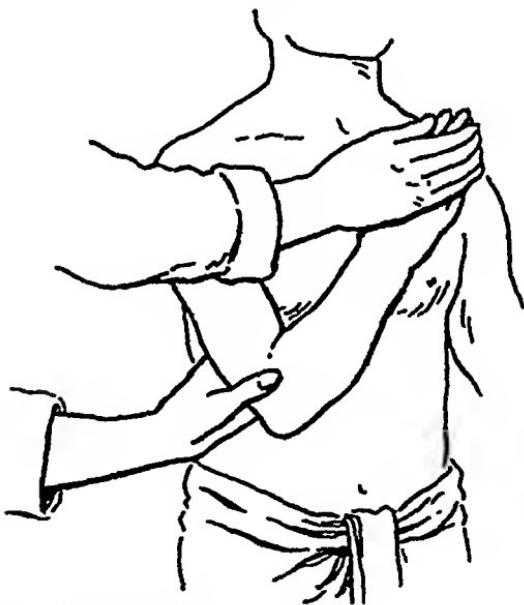


Fig 180. Rotating humerus inwards with the hand to
opposite shoulder (Kocker's method).

REDUCING DISLOCATION OF SHOULDER JOINT

increased passing the hand downwards from the shoulder joint, a depression will be felt and the whole shoulder will look flatter than the other. The elbow cannot be made to touch the side by voluntary action. The head of the bone can be felt in the armpit and if it presses any nerve, pain and numbness are felt at the fingers.

If the dislocation is backward and upward, symptoms will be in chief, a shortening of the arm and the elbow will remain touching the side.

Fix the scapula with one hand firmly, the hand being placed on the shoulder. Then draw up the arm over the head with the other hand if the dislocation cannot be so reduced.

Place the patient on the chair. Ask an assistant to steady the shoulder. Flex the elbow (Fig. 177), abduct the humerus and rotate it outwards as far as possible without using excessive force (Fig. 178). Then carry the elbow across the chest (Fig. 179) keeping up the eversion and finally rotate the humerus inwards (Fig. 180) (Kocher's method).

Lay the patient flat on his back. Seat yourself at his side facing him with one of your legs placed under his affected armpit. Now firmly grasp the wrist and put a steady traction downwards and outwards with rotation. The ball will slip into the socket with a snap (Traction or Extension method).

After reduction the part should be well secured with bandage for 4 weeks. After which for a month no hard labour should be done.

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Dislocation of Elbow Joint

There are many varieties, the commonest form being Cooper's dislocation of the elbow joint, the



Fig. 181.
Bandaging elbow (first aid).

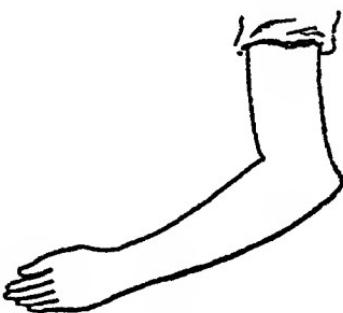


Fig. 182.
Dislocation of the radius
and ulna backwards

radius and ulna having displaced backwards. The hand is bent at right angles - elbow protruding behind. The humerus can be felt in front of the elbow.

Place the knee in the bend of the elbow on the upper part of the forearm and press keeping the knee in position of pressure forcibly and slowly try to flex the forearm. The bones will come to the position (Fig. 184). When reduction is complete the patient will be able to flex his forearm to an acute angle without any obstruction. Bandage and support on a sling. Passive movements should be maintained.



Fig. 183 Supporting fore-arm and elbow on a sling

DISLOCATION OF THE WRIST

Dislocation of the Wrist —Generally a dislocated wrist resembles the appearance of Colles' fracture. Extension is the only treatment to be accorded and then supported by bandage and a sling. To



Fig. 184. Reduction of the dislocated elbow.

differentiate it from fracture, fingers have to be passed over the ulna and radius in order to feel it.

It is often difficult to reduce this dislocation on account of the strength and tightness of the ligatures fixing the joint. To ensure tight extension fasten a

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tape around the nearest phalange in clove-hitch. Then have the wrist held firmly and put extension. Tie the bone which slips into the joint.

Dislocation of the Hip Joint.—The hip joint may have dorsal dislocation (backward and upward) or pubic dislocation (downward and forward). In the

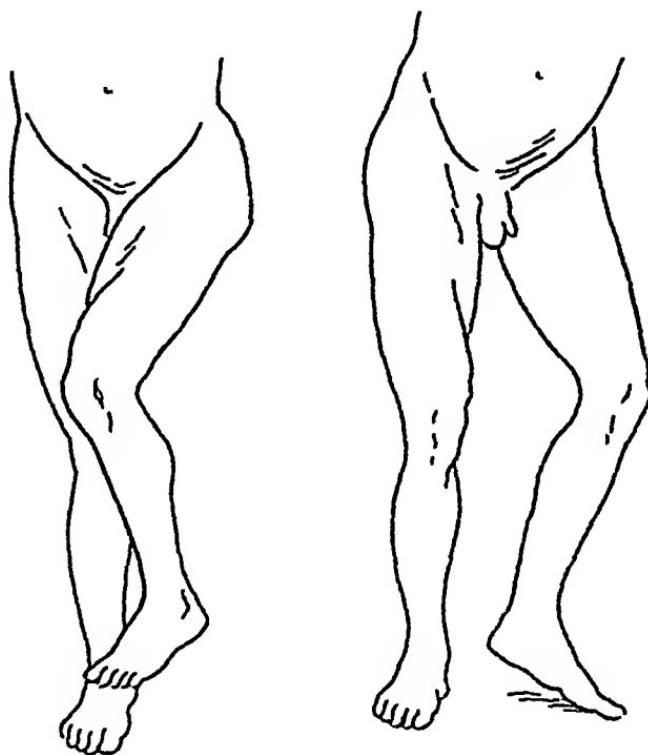


Fig. 185

Dorsal dislocation of the femur

Fig. 186.

Pubic dislocation of the femur

former the limb is shortened and in the latter the limb is lengthened

It will appear from Figs. 185-186 that in the dorsal position the knee is drawn inwards and forwards with

REDUCTION OF DISLOCATION OF HIP JOINT

the toes likewise and the heel outwards ; while in the pubic position the knee is drawn outwards and backwards with the toes and the heel drawn towards inside

In Dorsal Dislocation —Place the patient on the floor on his back Have the body and pelvis held fixed The limb should be well flexed with the body by raising the leg at right angles with the thigh and



Fig 187

Reduction of dorsal dislocation
by manipulation



Fig 188

Reduction of pubic dislocation
by manipulation.

then abducted and rotated outwards and brought down parallel to the sound limb The ball will slip into socket with a snap This method in short is described as lift up, bend out and roll out

In Pubic Dislocation —Place the patient similarly, then flex the thigh and slightly abduct, then rotate forcibly inwards The bone is adducted and brought

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down parallel to the sound limb. When this fails, traction or reduction by extension has to be applied

Hold the patient's shoulder tightly so that he cannot move. Also his abdomen may be held by another for firmness. Now put traction by extreme force in case of pubic dislocation by downward and outward traction, and in case of dorsal dislocation by downward and inward traction. Only see that in case of the former the ball will go up into the socket while in case of the latter the ball will slide into the socket by a little lateral pressure while the traction movement is on.

Dislocation of the Knee-Cap

It is most frequently displaced outwards. Reduction is not very satisfactory as once displaced it often tends for similar displacement. The patient is being negligent of so trifling an injury. Lay patient on back and raise the leg to about a foot high in order to relax all the leg muscles. Now hold the cap or patella by fingers and try to bring it to its former position. A little force will bring it to its position. After reduction secure the portion with a knee bandage. Complete rest of a month should be given

Dislocation of the Ankle Joint

This is generally associated with fracture of the small bones of the foot or of any of the two bones above the ankle.

INJURY TO MUSCLES AND TENDONS

The patient should be laid on back with thigh raised and the knee bent at right angles with the thigh Steady the knee, now hold the foot with one hand and the heel with the other. Put forcible extension so that the dislocated bones will come in situ with a snap Secure the ankle with padded splints and bandage.

Injury to Muscles and Tendons

Rupture of muscle may occur from a sudden and violent voluntary movement or from any involuntary spasm as in vomiting, coughing or tetanus At the moment a sense of tearing may be experienced Then there is acute pain and loss of function. It is indicated by a gap above and below which the ends of retracted muscles form a swelling which increases if attempt is made to put the muscles into action There may be extravasation of blood inside Temperature may be raised due to absorption of fibrin ferment

Relaxation of the part is necessary A firm bandage should be put with a good pad of cotton wool to stop extravasation of blood It should be kept continually soaked in very cold water When there are distinct signs of clotting of blood under surface and inflammation due to injury, hot boric compress should be applied

The limb must be massaged as soon as the patient can bear it The bandage should be kept on for a

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considerable period even after pain, swelling etc have completely gone, only removing it for sun and air to play on the part and for massaging.

Rupture of Tendon .— This occurs only as the result of a sudden and violent muscular action The tendon may be torn away from its muscle or ruptured in continuity. The following tendons are generally affected .

Long tendons of biceps, thumb and finger tendons.

Wounds

A wound is a break in the continuity of the surface or internal structure in any part of the body made by cutting, tearing or pressure Wounds may be slight requiring little attention and wounds may be serious and may be inflicted by sharp or blunt instrument

When only the surface layer of the skin is taken off by a fall or blow or friction, it is called abrasion When a sharp instrument gets into the body for some distance beyond the skin, it is called an incised wound Injury from a blunt instrument results in a lacerated wound, the edges of which are irregularly torn. A sharp blow or severe pressure may inflict a wound which may look like an incised wound but on careful examination lacerated edges of the skin will be found A contused wound is a variety of lacerated wound in which the injury is greater inside, the surface often having suffered little bleeding. A stab causes a punctured wound Internal structures or deep-seated

WOUNDS HEALING BY FIRST INTENTION

arteries and nerves are likely to be involved These wounds are dangerous

What has been said of fractures is also true about wounds Nature sets about repairing the injury immediately after If a healthy person's skin is sterilised and then a cut made and then bandaged with aseptic precaution, the cut ends coming together, then the process of repair begins immediately and provided that the wounded part is given rest, the wound would heal without suppuration This is the natural process From either side of the cut edge a white substance exudes joining at the breach Through this line repair goes on by formation of new tissues which interweave with the opposite faces If the wound is separated at this stage it will be seen that the white exudation has got new blood in it and that the process of repair has proceeded far If after some more time the wounded edges are again separated it will be seen that there is simply a white line where the cut was After further lapse of time this line may also be absorbed and may disappear If the skin is not made sterile but if the cut edges are put together side by side, still a wound may heal without suppuration This is called healing by first intention But if pus-forming bacteria find entrance or if the edges are not joined up, such a healing by first intention is not possible Yet it must be said that in cases of healing by first intention, it is not a fact that pus-forming bacteria are entirely absent They are there, but their number is few

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and they get swallowed by the leucocytes which rush to the site. The condition of purity of blood and general health also are great factors. In debilitated condition in spite of placing the edges of wound side by side in aseptic contact and under aseptic surrounding, pus will form.

Wounds not healing by the first intention are said to heal by second intention. There are grades here. Healing may be attended with small amount of ulceration or with marked inflammation and ulceration or suppuration.

When the edges can be brought together and the cut surfaces close up, the wound need simply be dressed with boric acid dusted over or by putting a piece of sterile cotton soaked in saturated 20% solution of boric acid and wrung out. The piece of cotton is to be kept in place by bandage. When there is dirt inside, the wound should be washed out and bleeding stopped. If the gap is so situated or so deep or wide that simple pressure cannot close it up, the edges should be stitched. Muscle in the interior may have to be stitched to facilitate contact between surfaces. After this is done and surfaces brought together, the wound should be covered up with a borated cotton and bandaged. When however there is so much loss of substance that even a suture is not of use, then the gap should be filled up with a plug of gauze dipped in hot boric lotion and wrung out and then bandaged.

WOUNDS . HEALING BY SECOND INTENTION

In such case the inflammatory exudation which quickly ensues, gets taken up and absorbed by the gauze and prevented from decomposing which would otherwise happen. Herein lies the utility of filling wounds with gauze. After this there is only a limited amount of ulceration of the surface and of surrounding inflammation. There is a little thin reddish discharge and when the gauze is raised, a glazed surface is exposed. The wound is covered up with small red elevations called granulations which fill up the wound gradually. The surfaces will be filled and edges unite by this process with the formation of an amount of fibrous tissue and some contraction and a scar will be left.

If however the wound does not so heal because of the severity, extent and inflammation already set up before dressing, then there will be acute inflammation extending to some distance and profuse discharge of pus. After dressing with antiseptic gauze the wound may proceed from bad to worse, create sepsis resulting in septic intoxication or hectic fever. On the other hand, it may not advance so far. The sloughs formed may separate, the quantity of pus may gradually diminish and the surfaces get covered with red granulation which is a sign of healing.

In using antiseptics, the stronger ones such as carbolic acid or iodine if not diluted very greatly may be a source of irritation and prevent healing by first intention or delay healing by second intention. Boric acid is a weak antiseptic but it is practically

ACCIDENTS

non-irritant. With scrupulous care about washing, cleaning and bandaging, boric acid may help healing quickly. But iodine has to be applied on dirty and exposed wounds to prevent tetanus and other grave septic issues. Where iodine and boric acid are not available, hot neem water should be freely used.

In dealing with wound the first thing is to stop bleeding. Next shock should be attended to as described under Nursing. Then the wound should be cleaned, made aseptic and bandaged after suturing or plugging with gauze as may be necessary.

The part should be given rest. A wounded part disturbed or exercised will create inflammation and refuse to be healed.

Wounds of the Head.— The head may be injured by a fall or a blow directed on it. The injury to the brain may take the form of a concussion or a compression. In concussion the circulation of blood to the brain is interfered with by shock. The patient becomes insensible, the pulse is feeble and intermittent, respiration is shallow or sighing, pupils contracted and the skin cold and pale. The patient may be roused to answer question. Vomiting is a constant factor. In compression however, there is internal bleeding in the brain and the insensibility is more complete although it comes gradually, breathing is laboured and slow, pulse is bounding but slow, pupils dilated and body warm. Compression of the brain reacts by increase of blood pressure which is evidenced by the above symptoms. A concussion of brain may ultimately

HEAD INJURY CONCUSSION COMPRESSION

lead to a compression of brain The symptoms either pass off gradually or result in death

Treatment for both the varieties of injury is the same Cold should be applied as early as possible A flow of water on head should be continued till the congestion of the eyes passes off and immediate distressing symptoms are relieved Sedatives do good After the patient has gained consciousness, chota chandra in 30 grains doses should be given three or four times daily Retention of urine is bad Attempts should be made to excite kidneys into action by alternate application of heat and cold on the back over the kidneys Cupping may also be resorted to

Shock if present, should receive the earliest attention The body should be covered and heat applied to the extremities along with cold on head

Laceration of Viscera — A cart wheel may accidentally pass over a man injuring the internal organs The heart and lungs may be injured by broken ribs The liver, the intestines and the kidneys may be lacerated, torn or ruptured These grave things may happen or a man fortunately escapes with only some superficial injury in case of such accidents When the internal organs are affected by mischance such as a cart wheel passing or a fall from a height or a compression between two passing boats or on account of blows directed on the viscera intentionally or accidentally, the consequence may be fatal.

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The exterior should be examined for signs of injury. Mere presence of symptoms of shock need not lead one to think that something very grave has happened. Cold moist skin, feeble pulse and shallow respiration may indicate nothing more than a severe contusion. If the symptoms subside it may be concluded that nothing grave has happened to the viscera. If on the other hand the symptoms aggravate, the pulse becomes more rapid and restlessness, thirst, increasing pallor and air hunger become evident, it will indicate that considerable injury has occurred to the viscera. In puncture of the stomach and intestines free gas becomes evident Hard board-like palpation almost invariably indicates injury to viscera. Signs of free fluid in the abdomen is strong evidence of extravasated blood or urine In the laceration of the liver blood gets accumulated in the right side of the abdomen and in injury to kidney blood accumulates on the opposite side It may involve the bladder and it should be found out in every suspected case of injury to bladder if it is really so. If a small bore say, No. 7 catheter is passed into the bladder and the quantity of urine passed out ascertained. If the quantity of urine is equal to what was expected and if there is no blood the presumption would be that kidney has not ruptured If on the contrary, some sterile water or normal saline passes into the bladder through the catheter and nothing or little comes out and what comes out is tinted with blood, it will prove that the bladder is ruptured.

LACERATION OF VISCERA RUPTURE OF SPLEEN

The help of an expert surgeon should be obtained in cases where laceration of viscera or rupture of either bladder or urethra is suspected. The patient may have chance of life if the abdomen is opened. In rupture of the stomach or intestine the likelihood of recovery is diminished by every hour.

Rupture of the Spleen —Spleen may be ruptured by a blow directed against it. It may rupture easily if it is diseased. A fall, a blow with a fist or a kick may cause rupture of a healthy spleen. When the covering of the spleen is torn blood escapes into bowels, collapse sets in. The person complains of great pain and faints. Rupture of spleen is quickly fatal and little can be done for the patient. Opium may be given to allay distressing pain. In rare cases life may be prolonged for several days. Probably in those cases blood is not poured out into abdomen immediately.

Sores or Cuts on Bowels —Animals may gore a man and a horn may be pushed into the abdomen. In such cases the problem will be to ascertain whether the intestines are injured or not. It may be that only the peritoneum is torn but the intestines are intact. Even if wound is not visible but if faeces escape through the wound or the patient passes bloody stool or vomits bile or blood, it will indicate that the intestines are torn. In such cases collapse will ensue. If the intestine protrudes through the opening it should be cleaned, pushed inside and the opening in the peritoneum mended by stitching and bandaged.

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with aseptic precautions If the intestine is injured, the cut should be stitched and sent back as if it was entire. Then the outer cut should be stitched and bandaged. The threads in the intestinal wall will be thrown off sometime inside the intestine and no harm will be done. A mud poultice should be applied on the abdomen and the patient kept on water only for a day. Afterwards liquid food may be given in small measures.

Children are sometimes gored by bulls and the sac of the testes gets cut. If the cut is only of the sac, it should be stitched and dressed aseptically If the testes are injured, after suture cold application should be continued by mud poultice

Cut Throat :— If the arteries are divided by cutting, death will probably happen before any aid can be rendered. But in attempts of suicide it generally happens that the trachea is only cut with or injury to the smaller arteries If the man is alive and bleeding, pressure must be applied on the artery The ends of the smaller and bleeding arteries should be twisted or ligatured. Bleeding will stop If bleeding is entirely stopped then the wound may be stitched and bandaged. If there is blood oozing out, stitching should be delayed and only a borated piece of gauze kept on the wound. After rendering first aid the man should be taken to a surgeon

Stabs in Chest :— Bleeding should be stopped. It becomes difficult to stop bleeding from an intercostal artery. Pressure should be applied to stod

STAB IN CHEST : MAULING BY ANIMALS

it If the heart or lungs are bleeding, the patient should be given a dose of opium and taken to the surgeon Opium may be repeated every two hours.

Mauling by Animals — Bleeding should be stopped first The injury if only muscle deep should be cleaned, washed, stitched and dressed aseptically.

The injury may be severe. The hand may be bitten to pieces and the chest may be wounded reaching up to the heart or lungs Treatment is antiseptic dressing after stoppage of bleeding Shock is a great factor and should be attended to.

Spikes and hooks may inflict punctured wounds. All dirt and splinters should be cleaned out after stopping bleeding and stitched if necessary and bandaged with aseptic precautions Fishing hook may get fastened accidentally under the muscle Sometimes it is necessary to push the hook point up making a flesh wound through which the end of the hook may follow Otherwise an incision has to be made and the hook taken off Pushing the fixed hook will make the case worse by tearing the muscles Thorn may get into soles of feet and cause wound Dirt generally gets in with the thorn and this invariably causes inflammation and suppurates and also lingers, because rest is rarely given

After extraction of the thorn, the wound should be cleaned by irrigating with water Tincture iodine from a swab should be squeezed in to penetrate to its end The wound should be dressed and the foot given rest If the thorn comes out only partly leaving

ACCIDENTS

the point deep in the muscles, the wound should be opened and the remnant drawn out with forceps. If the wound is bandaged while a bit is left behind it is sure to suppurate, the pus eventually bringing out the left out portion.

Splinters under the nail should be treated as thorns in foot. Often some blood remains extravasated after the withdrawal of the splinter. In such case a little opening under the nail will help the blood to be squeezed out. The point should be given a touch of iodine.

Sutures

Suture is a very necessary operation for treating wounds. The surfaces of wound must be brought together to quicken the process of healing. For stitching wounds surgical needles are available. They are straight, curved and straight and curved. The difference between an ordinary sewing needle point and a surgical needle point is that the surgical point cuts the skin through with the sharp prominent edges while ordinary needle is round all through. After a sewing needle has passed through muscle and skin, the thread following fails to pass on, the skin offers resistance. The skin point should be cut and not mere punctured with a point. For this purpose the point of an ordinary needle may be flattened and sharpened to make it serve the purpose of a straight surgical needle when a surgical needle cannot be obtained.

SUTURES SURGICAL APPLIANCES

For village work silk thread is best. It can be kept worsted or plain and used. In emergencies threads may be taken out of silk pieces and twisted to form sewing thread. Cotton thread may also serve. These threads are unabsorbable and ultimately have to be cut and drawn off in external sutures. Catgut gets absorbed and is therefore a suitable thing where the suture may be left to be absorbed within the wound.

The process of sewing may be one of passing the thread through in and out at the two edges and tied with a knot. Sewing may be continuous also.

Surgery of Boils and Abscesses etc

A home and village doctor may be required to perform surgical operations of the nature of a boil or abscess, in which the wound cannot be left to itself. In such cases operations of a simple nature should be performed with due aseptic precautions. For performing such minor operations, the following instruments and articles will be necessary.

Knife with a sharp point

Forceps

Probe and director

Scissors

Artery forceps

Straight and curved surgical needles

Silk thread

Catheter, rubber

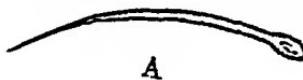
Bandages

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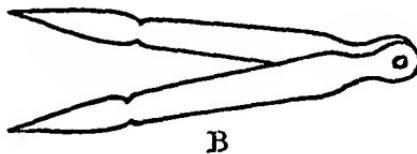
The knife should be preferably with a metal handle for easy cleaning

The forceps are like pincers with lines indented inside for better grip.

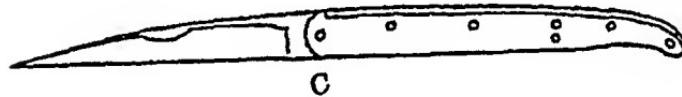
Probe is a silver or german-silver wire with a



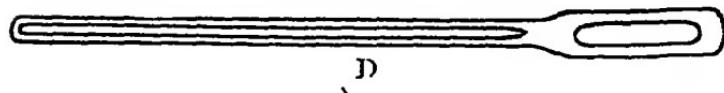
A



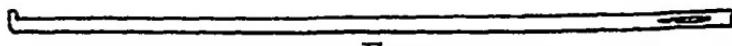
B



C



D



E

Fig. 189 A Curved surgical needle, B. Forceps,
C Knife, D Director E Probe.

rounded point to feel the depth and direction of a wound. On one face of a probe is a groove which is used for directing the knife point by which the knife may not depart from a predetermined path.

SURGICAL APPLIANCES • PREVENTION OF SEPSIS

Surgical scissors are like ordinary scissors which may be cleaned thoroughly.

Artery forceps can be locked after gripping an artery. The artery may be drawn up and twisted to stop bleeding or a ligature may be put on it while under the grip of the forceps.

Surgical needles have a triangular point and are either straight, curved or semi-curved to suit different positions of suture.

Silk thread, ordinary knitting silk thread may be used.

Rubber catheters of different sizes should be kept from No 4 to No 12 for emptying the bladder or for irrigating the intestines or uterus fitted to the nozzle of a douche-can.

Prevention of Sepsis

We have seen that wounds can heal by first intention. At the root of the matter there are several conditions. There must be no access of pus or other disease-forming bacteria in or about the wound and the patient's condition of health and of blood should be such as to be able to resist the action of the injurious bacteria. When these conditions are not present, wounds, cuts and surgical operations naturally involve unknown risks, risks which impede the course of healing certainly and may end in graver disasters. At one time every surgical operation involved such risks. A way however, has been found to prevent sepsis in wounds and surgical operations.

ACCIDENTS

Certain substances have the property of killing pyogenic bacteria. The use of such substances would prevent sepsis, provided they do not irritate the part or otherwise act injuriously. Such substances are antiseptics. Choice has to be made between one antiseptic and another in regard to their special and non-poisonous and non-irritating character. Carbolic acid, mercuric chloride, potass permanganate, tinct iodine, boric acid, iodoform, hypochlorite are all antiseptics. These have their uses and limitations. For our purpose we have selected tinct. iodine, boric acid and neem leaves boiled in water or neem water as antiseptics. Potass permanganate and thymol are there, they also are antiseptics and are used in home treatment. If chemicals like iodine, boric acid and permanganate are not available, still we would be left with neem water to serve our purpose. Heat is a very powerful antiseptic and so is sunlight. For heat to be sufficient to ensure death of bacteria, water has to be raised to a temperature which will scald the skin. If plain water is boiled and immediately used just lowered to the point when it is bearable, it will be a tolerably good antiseptic. Water boiled with neem leaves and used as hot as can be tolerated will serve our purpose. None of the antiseptics recommended for home treatment are strong antiseptics. They are weak in their action but suitable for use in cases to be dealt with by a home doctor.

Besides the wound, the hand of the operator, the instruments, the dressings and the skin also should be

ANTISEPTICS . STERILISER

in aseptic condition. Where a boil has to be incised or a wound is to be cleaned or dressed, precaution for asepsis of operator's hands and instruments, of dressings and of the skin, should be made.

Saturated solution of boric acid in water or 1 boric acid to 5 of water may be used for dipping gauzes for cleaning and dressing wounds. Where iodine is available, a dilute solution of it just enough to lend its odour or tint to the water is good enough for rendering the hands, instruments and skin aseptic. A tray may be used for boiling the instruments in neem water. Iodine irritates wounds. Where large surface is to be dressed, boric solution 1 to 10 of water, may be used. Boiling neem water may be used for sterilising instruments and hot solution may be used for the patient's skin and the operator's hands.

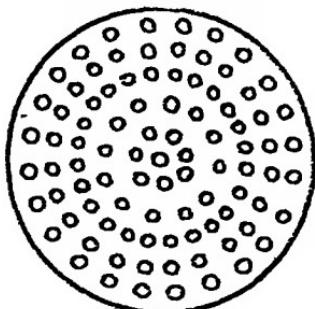
In operating, if the patient's skin has hairs, they should be shaved off and the skin cleaned with soap water and rendered sterile by application of antiseptics as mentioned above. A wash with a very dilute solution of tinct iodine enough to tint water is very effective for disinfecting skin of the patient and of the operator's hands as well.

Sterilisation of cotton, bandage etc is of great importance. An improvised steriliser may be used for this purpose as described below.

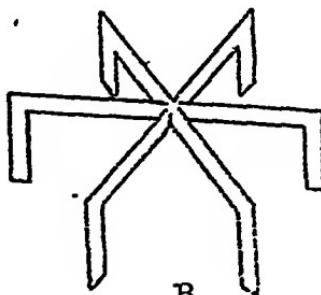
Steriliser — A steriliser can be improvised out of a flat bottom pan with a lid. The pan may be of brass or aluminium. It has to be provided with a shelf of wire gauze.

ACCIDENTS

Take three pieces of wire two inches longer than the diameter of the pan. Fold an inch at each end at right angle. The wire may now be spread out and fixed by a wire looped and passed over each. This forms the support of the shelf and is put inside the pan.



A



B



C



D

Fig 190. A Shelf of wire gauze, B. Stand, C. Pan, D. Steriliser.

The shelf may be a piece of brass wire gauze cut to a circle. The shelf is put on the support.

If wires and wire gauze are not available, strips may be cut from an old aluminium pan and bent to form the support. The circular bottom of any old and useless aluminium pan will make a nice shelf if it is

STERILISER · BOILS

cut in a circle and perforated with a large number of holes made by the point of a nail The pan, support, shelf and the lid complete the steriliser

Now put the instruments at the bottom of the steriliser with needle, thread or silk gut etc. and pour some clean water into it enough to cover them and a little more Then place the stand and shelf over it Over the shelf place the bandage, cotton, gauze, lint etc Cover the pan Put the whole thing on a fire and go on boiling briskly Add water if necessary to make up for evaporation so that there may be always some water left at the bottom Enough water should be put in at the start so that replenishing may not be usually necessary Half an hour's boiling and steaming will complete sterilisation

Boils

A boil is an inflammation of the skin and subcutaneous tissues. It usually begins as a red pimple with a hair in the centre and as it increases in size, it forms a painful, dusky and conical swelling with a flattened apex Boil appears on face, neck, back, groin, in the armpit and round a hair When it appears on eye lids at the root of a eyelash it is called a stye Boils are common in the young but occur in all ages Boils are induced by general ill health, too much of protein in diet or after acute diseases in which blood may get deteriorated.

ACCIDENTS

The inflammation may subside of itself. More often the cuticle bursts at the apex and a yellow slough is seen. This is the core. An abscess is differentiated from a boil by the absence of this core. The core of slough is cast out through an opening.

For treatment general health should be improved. When there is constipation, bowels should be moved and neem, vegetables or juice of raw leaves containing vitamins should be given. If there is much pain, datura paste mixed with honey may be laid over round the hair in the form of a plaster taking care that the plaster does not get inside the opening. Iodine paint often relieves pain and helps absorption. If this measure is not enough, hot fomentation is to be applied with neem water. Boric compress is also good. If necessary, the mouth may be opened by a sterile needle or knife and the core pressed out if it is ripe for being so thrown out. After the operation, an antiseptic ointment is to be applied and dressed. If the sloughing core does not come out by pressing, then hot poultice is to be applied to soften the boil and let all slough be thrown out. *Tokmari* is of use here. *Tokmari* seeds are to be taken and made into a sort of paste with water. More water is mixed and kneaded till the mass is like poultice which is then applied over the boil. The mass sets and draws up purulent mass from inside, relieving swelling and pain. In two or three days, the wound if small, heals.

FORMATION OF ABSCESS

Abscess

An abscess differs from a boil in not having a sloughing core tissue in the centre in the form of a core like boil. It is a painful and inflamed swelling which after the abscess has run its course terminates in a discharge of yellow creamy pus. An abscess may be present in any part of the body. A gum-boil is an abscess and so also whitlow. A mother's breast while sucking develops abscess. An abscess may form from local injury. Weak patients suffering from a long time, in whom the vitality is low, develop abscess at the slightest injury or pressure.

An abscess may grow slowly with little redness of the part or it may appear as a quickly inflamed painful swelling. The swelling becomes hot, red and tender and there is a throbbing pain. The skin round about the abscess becomes soft and retains pressure mark of finger. Gradually the abscess ripens. The apex becomes more prominent and the skin gets thin. The abscess may now burst and discharge pus through one or more points in the thin and distended part of the skin.

As the abscess matures to form pus, more or less general symptoms appear. There may be shivering, pain over back, headache and feverishness. When the abscess forms deep down in the muscles or beneath tendons and ligaments as in whitlow or under thick hard surface of the skin as under the foot, the suffering is more intense.

ACCIDENTS

In the second form of cold abscess the process of formation is swelling and is slow and after a long time an apex may form. The beginning is without much pain but the termination is more painful as a large area is involved and a hectic fever may prevail indicating absorption of poisons formed on the abscess. Mud poultice and cold application in the earlier stages may help absorption. If there is much pain, datura made into paste with water and mixed with honey may be applied as a plaster. When the pain is intense, some opium may be mixed with plaster and applied. Constitutional defects should be attended to. The patient should take necessary exercise and expose the part to sun's rays and have it massaged round about the swelling. Milk, nutritious diet containing little protein and as much as possible of vitamins should be given.

If poultice will not make the abscess to be absorbed, heat should be applied in the form of fomentation of hot boric compress or hot linseed poultice. This will induce suppuration. Application of tokmari poultice helps both absorption and suppuration according to the stage of the abscess. Suppuration is the degenerating phase of inflammatory process which causes destruction of tissues at a higher rate than the regenerating phase can overcome it. Suppuration may be limited or circumscribed as in a boil or it may diffuse more or less uniformly having many foci constituting a number of abscesses. On suppuration the spot

FORMATION OF ABSCESS • ASEPTIC OPERATION

becomes tender to pressure and a sensation of displacing of fluid or fluctuation is felt on pressing alternately opposite edges along the length of the muscular tissues involved. At this stage the abscess may burst of itself as the pressure inside increases and overcomes the resistance of the gradually thinned skin.

It may not however burst of itself if the skin is thick or if the abscess is deep-seated. On the formation of pus under such circumstance the abscess is to be opened by an incision after aseptic precautions. In incising care should be taken so that the larger blood vessels near may not be touched. The incision should be along the length of the muscle or across a fold if it is in a pit or joint. If arteries are injured bleeding will ensue which will have to be stopped quickly to avoid grave consequences. Artery forceps should be ready near at hand to catch and press an artery to prevent bleeding at such an emergency. Deep structures may be avoided by using Syme's abscess lancet.

The skin should be made aseptic. For operating hold the knife with its cutting edge upwards and push the point through the elevated and soft portion of abscess. The point of the knife will pass through the swelling to the opposite edge. Now pull the knife through connecting the two points by the incision. Clean out pus with the help of a swab. Put some sterile boric gauze made by dipping a cut piece of bandage in hot boric

ACCIDENTS .

lotion and squeezing and close the wound by a bandage after putting some sterile cotton padding over it. The wound should be dressed daily. Plugging with gauze is to be discontinued when not necessary. The patient with very big abscess should be taken to a surgeon

Carbuncle

Carbuncle like the boil has a sloughing centre or core of dead matter. It is larger than a boil and is of a more serious nature. A boil may develop into a carbuncle on account of some unfavourable circumstances or predisposing causes. Gout, diabetes and albuminuria all predispose a patient to develop carbuncle. When carbuncle develops it becomes again a very serious thing running down the vitality quickly. Exhausting causes like acute fevers and prolonged lactation may induce abscess. Friction and pressure are exciting causes.

It begins as a hard painful swelling, accompanied by low fever and a general depression. The swelling spreads and forms a flattened prominence on the skin, surrounded by redness. Vesicles form over its surface which bursts exposing a yellowish slough. The skin gives away at several places instead of at a single place. The whole mass becomes like a honey comb. The apertures coalesce and a slough is thrown off leaving a wound. On the other hand, the inflammation may continue to spread and the patient's

CARBUNCLE SINUS . FISTULA

condition becomes poor ending in death by blood poisoning or anaemia

The strength of the patient should be kept up. Fresh air and water should be allowed to act on the skin. Slight moving about is good. The patient should not take to bed if he can avoid it. If there is much pain, opium may be given internally and opium may be mixed with boiling water and the part fomented with it.

Incisions should be made joining the openings. The incisions should be as deep as the sloughing is. The sloughs should be scraped off with a sharp spoon. Warm water tinted faintly with copper sulphate will facilitate removal of slough. The surface should be swabbed with boric lotion and boric fomentation applied. Serious cases of carbuncle should be sent to a surgeon whenever possible. If none is available, the treatment should be continued as indicated above.

Sinus and Fistula

When in an abscess outlet for pus is not big enough, sepsis generally travels inwards killing the tissues around its path. It then creates a sinus. It is blind at one end. When a sinus has got both ends open it is called a fistula. Fistula is a septic canal communicating internal cavity with the surface. It may be communicating between the skin and a mucous or serous cavity or may be joining two mucous cavities.

ACCIDENTS

Medicinal treatment sometimes heals sinus or fistula. Resin ointment is very helpful in healing sinuses. It should be applied before dressing. Treatment is embodied in antiseptic dressings daily or once in 12 hours and irrigation of the sinus with some antiseptic solution. Copper sulphate lotion is good for the purpose.

The lotion should be drawn into a glass syringe and pushed into the sinus cavity and washed out. If possible, the opening may be plugged.

Sometimes constitutional treatment accompanied with the irrigation of sinus cures it. Nutritious diet and sun, air and water application for improvement of health should be attended to carefully in this and such lingering diseases.

Whitlow

Whitlow is a septic inflammation of the finger. The infection usually spreads from nail corners or pricks. In the beginning it undergoes usual inflammatory changes. If at this time proper attention is paid to it, the inflammation may subside. Otherwise pus gradually forms in the finger very near the bones. This is felt by a throbbing sensation or feeling of an ant travelling. A protrusion is seen outside when the whitlow tends to burst out, but the skin being very thick it cannot do so. By the time the dermis is eaten up by pus the infection inside causes necrosis and gets diffused. As soon as there is indication of pus formation with local rise of

WHITLOW BUBO

temperature, whitlow should be opened Boric fomentations should be applied and dressed.

The incision of a whitlow should be longitudinal with the finger and it must be full and deep, otherwise proper draining out of pus will not be possible from the necrosed area, requiring repeated operations.

Subsequent to operation the finger should be dressed daily. The finger is to be kept dipped in hot neem lotion for sometime and then cleaned and dressed with a gauze over it

Bubo

Bubo is an inflamed condition of the glands in the groin. It may be due to injury or any sepsis running from the surrounding area. Septic bubo is generally due to infections from gonorrhoea and syphilis. Fever generally appears on the 3rd or 4th day of inflammation. Bubo may be both-sided at the same time. When due to injury it is generally one-sided. Early treatment consists in relieving congestion by purgatives and anodyne paints after fomentation. Paint should be continued even for one or two days after the swelling has subsided.

Before opening a bubo, the part should be first well shaved and cleansed. In operating a bubo one has to be cautious. The area involved is full of important blood vessels. One is to be sure about the presence of pus before operating. The opening should be made obliquely along the fold of the skin with a

ACCIDENTS

Syme's abscess lancet. The opening should not be made very deep as it may injure inner vessels. If required, the opening may be made bigger later carefully.

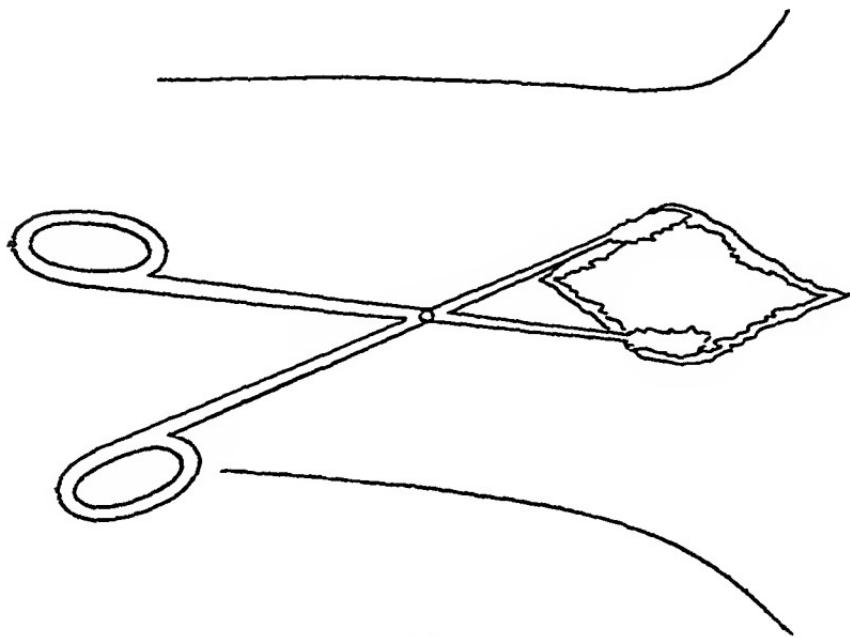


Fig 191 A dressing forceps with a piece of hot cotton wool or gauze

Axillary Abscess

This inflammatory condition under the armpit is generally due to infection.

In the early stages of inflammation constant heat is to be applied by fomentation. Armpit should be kept bandaged after fomentation. There is a prevailing custom in villages to pack the armpit with a piece of blanket whenever any inflammatory process occurs. This helps subsidence.

AXILLARY ABSCESS GANGRENE

Axillary abscesses should be opened very carefully, otherwise important vessels may get injured. Cleanse the part carefully by shaving or cutting the hairs with a pair of scissors. Paint tincture of iodine over the whole area of armpit. Cut a small longitudinal incision superficially and insert the teeth end of dressing forceps inside about $\frac{1}{2}$ inch deep and force it open. This will help the mouth to be enlarged so as to enable deep-seated pus to drain out.

When pus has been drained out by pressing from sides, swab the wound, plug it with a thin piece of sterilised gauze boiled in neem water. Cover the gauze with some absorbent cotton and finish the bandage.

Gangrene

Gangrene is an ulcer manifested by death of the part already affected. Dry gangrene is marked by the part affected assuming a pale and white appearance, mottled with brown here and there. Generally it exhibits same changes as are seen after death in body. The skin is cold. When a cut is made into the limb it is seen to be bloodless for which it generally mummifies. Soon the skin shrivels and is converted into a black mass which is separated from the healthy tissues of ulceration. It has a musty odour. In moist gangrene the limbs are distended with venous blood. It is inflamed at first. A peculiar burning sensation is felt just before the circulation ceases.

ACCIDENTS

Gradually the limb becomes cold and putrefaction commences. The haemoglobin diffuses and the limb undergoes some change in colour from red to brown ultimately to green and blackish green. A foul odour of decomposition becomes evident. The skin becomes slimy and separates on touching. The causation of gangrene is due to partial or complete failure of flow of blood through the affected part.

The predisposing causes are old age, feeble action of heart, fatty degeneration of heart, Bright's disease, diabetes and anaemia. Mechanical causes are crushing of the part, burns of the 5th degree, frost-bite, acid burns, constant use of tight bandages and elastic tourniquets kept too long.

Treatment of gangrene lies in amputation of the part. In the meantime antiseptic dressing with carbolic lotion etc may be tried and means adopted to maintain strength and improve general health of the patient. The patient should be sent to a surgeon.

Phimosis

Phimosis is a condition in which the skin (prepuce) covering the glans penis is unnaturally elongated with a small opening in such a way that it cannot be drawn back to expose the head of the penis. This condition is often congenital but also may be resultant of syphilis, gonorrhœa etc.

Treatment is by operation known as circumcision. Operation should be performed at a very early age. It can be seen in villages that cultivators perform

PHIMOSIS . CIRCUMCISION : PARAPHIMOSIS

circumcision of their children They do not usually put any stitches after operation.

The operation in majority of cases is very easy. Hold the elongated skin with the left hand , push back the glans penis inside so far as it will go. Secure the prepuce there with a pair of forceps applied on the skin Cut out the elongated skin from the outer side of the forceps Expose the glans penis and then stitch

the incision Dress aseptically Open stitches after 4 or 5 days No stitches are required for children.

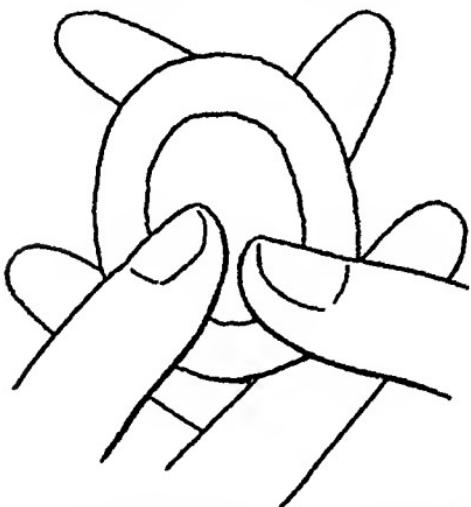


Fig 192. Methods of reducing paraphimosis by digital pressure

swelling and redness of the glands and prepuce
Micturition is painful

In very primary stage application of cold reduces the swelling and then the glans penis can be pushed in smearing it with a little oil In late cases perforation of the inflamed mucous membrane is necessary with the head of a sterilised needle to let out fluids from the swelling After this reduction may be tried

Paraphimosis

It is a condition in which the foreskin being drawn back from the end of penis, remains there and cannot be returned. The result is a painful

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Prolapse of the Rectum

It is generally an affection of children in very chronic cases of dysentery. It may also occur in adults.

To reduce it place the patient in a tub of tepid water and then with the help of the palm of the hand push the anus inside. As it is reduced put a triangular bandage as support for the part Laxative should be given to ensure soft stool. The patient should use some sort of commode for a few days. When the prolapse recurs, apply astringents in the form of myrobalan paste and opium externally on the anus In dysentery. take every care to cure it

Hernia

Hernia is the protrusion of some enclosed organ from its normal position

There are generally two varieties, the umbilical hernia and inguinal hernia. It may be both congenital and acquired.

Hernia is felt by a sensation of something giving way. It gradually gives place to a soft elastic swelling of the part into which it protrudes.

In umbilical hernia a part of the intestines finds its way through the umbilical ring into the umbilicus In inguinal hernia a part of the intestines finds its way into the scrotum or the sac, through the scrotal ring or inguinal ring A hernia may be reducible, irreducible or strangulated

VARIETIES OF HERNIA

Reducible hernia is one that can be returned into the abdominal cavity, it may either go naturally or may be helped to go into. Irreducible hernia is one that cannot be returned by manipulation.

Strangulated hernia is one in which the escaped portion of intestine is so tightly gripped at the ring that the circulation through the blood vessels becomes impossible resulting in inflammation and ultimately into gangrene

All varieties of inguinal hernia are best amenable

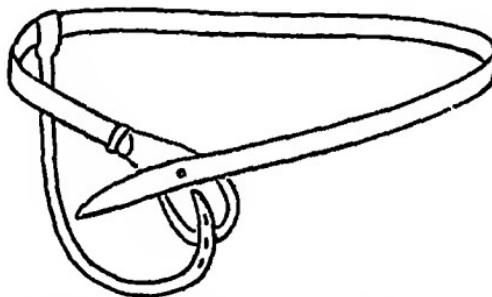


Fig 198 Truss for inguinal hernia

to surgical treatment for which surgeon's aid should be sought for

Palliative treatment of hernia is not satisfactory unless commenced early. The main principles of treatment are occasional cleaning of bowels by oily purgatives and continued pressure on the ring through which the intestines tend to escape. Pressure is given with a sort of spring known as hernial truss. Trusses are of different sizes and appearance. One fitting accurately should be secured and applied

ACCIDENTS

In congenital hernia of children, leather or spring truss will not be advisable. Pressure should be put with a soft cloth or wool twisted into the form of a soft rope. The umbilical hernia may be cured by a bandage with a pad on the navel. Congenital inguinal hernia of children is easily amenable to treatment. The child should be constantly kept in lap with pressure on the part. The leg of the affected side should be lightly pulled up.

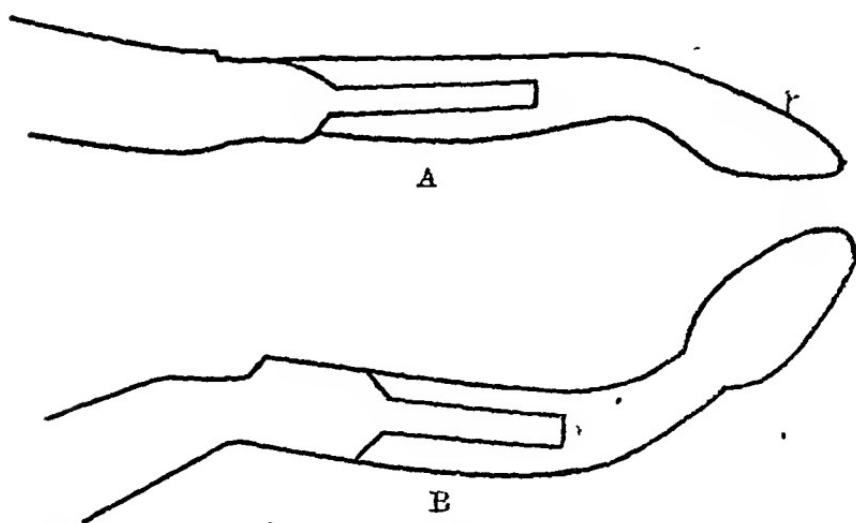


Fig 194 A. Process of holding the forceps in case of lower tooth, B. Process of holding the forceps in case of upper tooth.

Extraction of Tooth

To draw tooth, a universal tooth forceps is required. Before attempting to draw a loose tooth keep ready at hand some cotton, alum and boric lotions. Ascertain which tooth is to be drawn out. Hold it with the forceps (See Fig 194).

EXTRACTION OF TOOTH BANDAGING

Try to loosen the tooth from the root by inward or outward movement, then pull out the tooth by a steady force. Do not apply undue force or jerk. It may rupture some vessels of the root and result in excessive haemorrhage. As soon as the tooth is brought out take some cotton, dip it in alum lotion, and plug the root for a few minutes. After removal gargle with alum lotion.

Tincture of iodine may be applied before and after extraction for antiseptic measures, at the root of the tooth.

Bandaging

A roller bandage is made by tearing appropriate material into strips of desired width and then rolling. It is generally the most convenient form for the limbs. Knowledge of bandaging assists to a great extent the treatment of wounds, ulcers and operated abscesses. The most useful material in villages and homes is clean old cloth. This is absorbent and soft. Old cloth should be freed from all dirt and grease and bleached by thorough wash and sunning and then made into bandages.

In bandaging see that the bandage is tightly and evenly rolled before attempting to use it.

Apply the outer side of the free end to the skin and un-roll only a few inches of length at a time. Bandage from below upwards and from in outward in front of a limb. Each layer of bandage

ACCIDENTS

should cover two-third of the preceding one as far as practicable. This means every turn of a three inch bandage advances the covering by one inch. The bandage should be applied evenly and lightly so as not to stop the circulation.

When the bandage is finished, fix it by a stitch or divide the end lengthwise and tie them round the limb on the body.

The roller bandage may be applied as a spiral, as reversed spiral and in figure of eight form.

The simple spiral is made by simply encircling the part with the bandage in a spiral form.

The reversed spiral is used for bandaging those parts where the thickness of the body varies, making simple spiral bandage impossible to lie in proper situ. The bandage has to be folded on itself and the form of spiral reversed. In reversed spiral the turn should be on the outer side of the limb and it should not be on the prominence of a bone. At the moment of giving the turn hold the bandage a bit loose, however tight it has been made before. Bandaging should not be unrolled more than is required for the reverse or turn.

Figure of Eight (8) is generally used for bandaging joints or where the joined portions are at angles or might have to be kept at angles. A spica is a modified form of figure of eight adapted for difficult joints like the thumb and the shoulder. The four-tailed bandage is a short length of bandage about 3ft. long, the two ends of which are split

BANDAGING : TRIANGULAR BANDAGE

while there is a slip in the centre to receive the protuberance of a part like the chin

Triangular bandage is made by cutting a 40 inch square piece of cloth diagonally in two pieces. This piece may be folded once to form a broad bandage and twice to make a narrow bandage

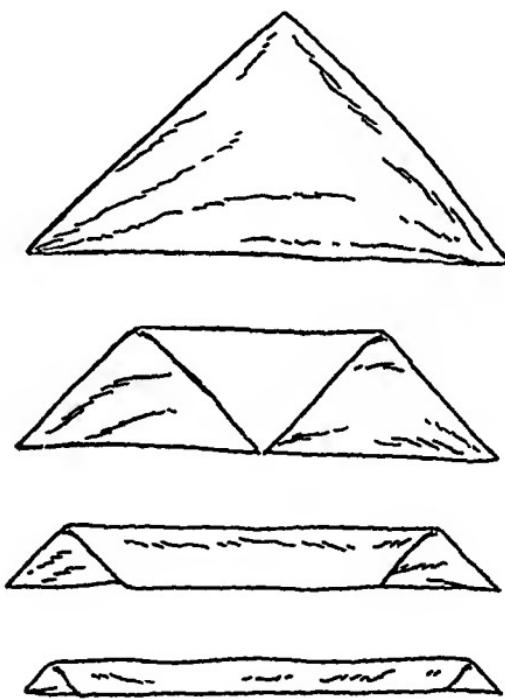


Fig 195 Triangular bandage

It can be used for a sling or for bandaging the head, trunk and for a variety of purposes A triangular bandage is intended for a first aid bandage The accompanying figures will show how the roller bandage may be tied as a spiral, reversed spiral

ACCIDENTS

and figure of eight or spica which is a slightly altered form of figure of eight.

Illustrations indicating the uses of the four-tailed and triangular bandages are also given.

The roller bandage has the most use. It is tedious to follow the directions for bandaging each particular limb but illustrations make many points clear and the aspirant for learning the art of bandaging



Fig. 196. Bandaging groin
(first aid).



Fig. 197. Bandaging ankle
(first aid).

should go on bandaging with the illustrations before him till he learns how to put neat bandage suitable for an injury.

T-Bandage is useful for retaining dressings in the perineum or anus. It is formed of two pieces of linen, one about 3" wide, is to go round the waist and to the centre of it, is attached another piece to pass between the thighs holding the

T-BANDAGE : ROLLER BANDAGE FINGER BANDAGE

dressings *in situ* and tied with the linen around the waist opposite the point from where it commenced. It looks like a *langote* and is used in a similar manner.

Roller Bandage — Take the strip of cloth and for the first foot or so make zigzag folds. Then folding this on the palm of hand roll. Have an

assistant to hold the strip some distance away in front. In the absence of an assistant tie the far end with a post and roll on and advance to the post. Take care to see that the edges are straightened, the bandage is rolled tightly.

The bandages should be 1" for finger, 2" to 3" for arms and legs and 4" to 6" for the trunk. Four-tailed bandage for jaw should be also 6" wide. Length should be usually 5 yards per roll. When one roll is finished another should be

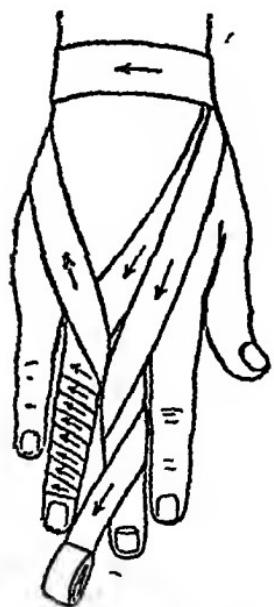


Fig 198
Bandaging the fingers
stitched on to it

Bandaging the Finger — One inch wide bandage is taken. The bandage starts with a turn on the wrist for fixing the end, then it is carried to the root of the finger and by a spiral to the tip of it. Thence it is folded and the finger bandaged in descending spiral the last spiral being continued back to the wrist is

ACCIDENTS

carried to the next finger over the back of palm and the process is repeated (Fig. 198).

Bandaging the Thumb:—Width of the bandage should be one inch or one inch and a half.

Take the roll across in front of the wrist between thumb and index finger ; turn round thumb, diagonally above front then along back of hand to wrist ; thence across palm and round thumb
 Continue by gradually coming downwards till the ball of thumb is covered Finish by passing round the wrist and secure with the tail left (Fig 199).

Bandaging of Hand:—Width of the bandage should be 2 to $2\frac{1}{2}$ inches. Pass the bandage roll from between thumb and finger across back of hand, front of wrist and back of hand to 5th finger nail and then take once round fingers. Now make a figure of eight round the hand Repeat figure 8 until the hand is covered, then bring round wrist and secure (Fig. 200).



Fig. 199.
Bandaging the thumb.

Bandaging of Forearm:—Width of bandage—2 to $2\frac{1}{2}$ inches Start with the wrist and put 2 or 3 simple spirals round the wrist and then put on reverse spirals on forearm Complete towards the elbow joint (Fig. 201).

BANDAGING OF THE HAND AND FOREARM

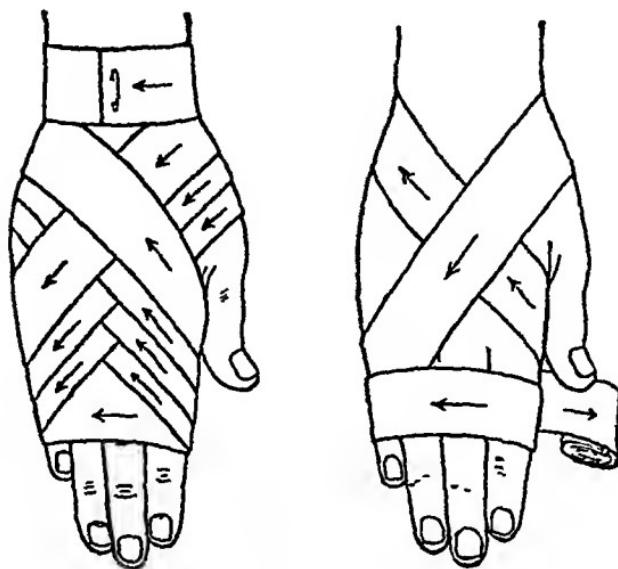


Fig 200. Bandaging of the hand

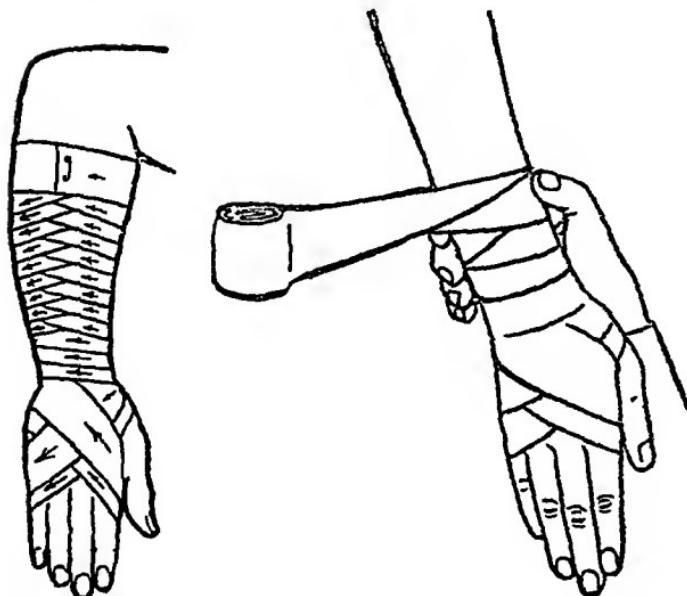


Fig 201. Bandaging of forearm

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Bandaging the Shoulder :—Width of bandage is 2 to $2\frac{1}{2}$ inches.

Proceed as in the case of spica for thumb. From inner side of arm, round arm ; thence over the front of the arm across the back ; under the armpit, across the chest to the outer side of the arm, across the back of the arm. Repeat till sufficiently covered.

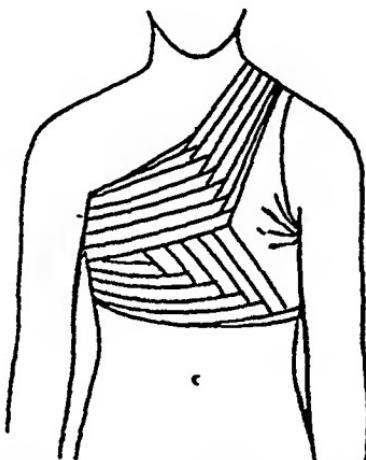


Fig. 202 Bandaging the breast.

Bandaging the Breast :—Width of the bandage is 3 inches.

Course . From left hand side of back of waist, round waist , over left shoulder to right side of waist , repeat until the breast is sufficiently covered.

Bandaging for both the Breasts .—From right hand side of back of waist round waist, over left shoulder to right side of waist, half-way round waist ; over right shoulder to the left side of waist,

BANDAGING OF GROINS AND FOOT

and half-way round waist Repeat alternately over the left and right shoulders until both breasts are covered

Bandaging the Groins —Carry the roller from the junction of thighs to crest of right hipbone then across loins to left hip, thence to outer side of and behind the thigh Repeat until the groin is sufficiently covered (Fig. 203)

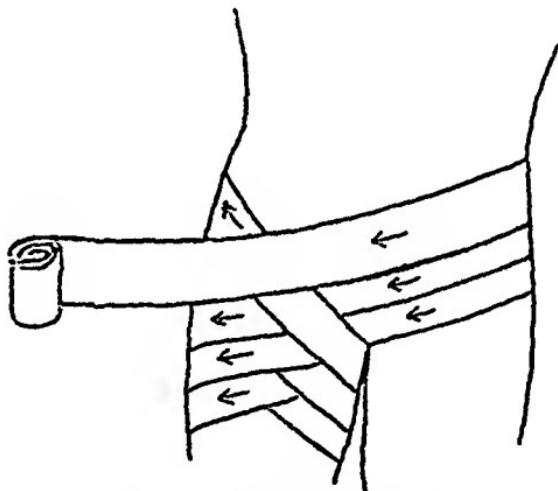


Fig 203 Bandaging the groin

Bandaging the Foot.—Start from the inner side of ankle Pass over foot to the root of the fifth toe, then put simple spirals round the foot for two or three turns Then reverse the spirals on the foot. Proceed with reversed spirals round the foot till the ankle is reached Make figure of eight round ankle and foot until the part is sufficiently covered Pass now once round ankle and secure (Fig. 204).

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Bandaging the Leg —Width of the bandage is .3 inches (Fig. 205)



Fig. 204 Bandaging the foot.

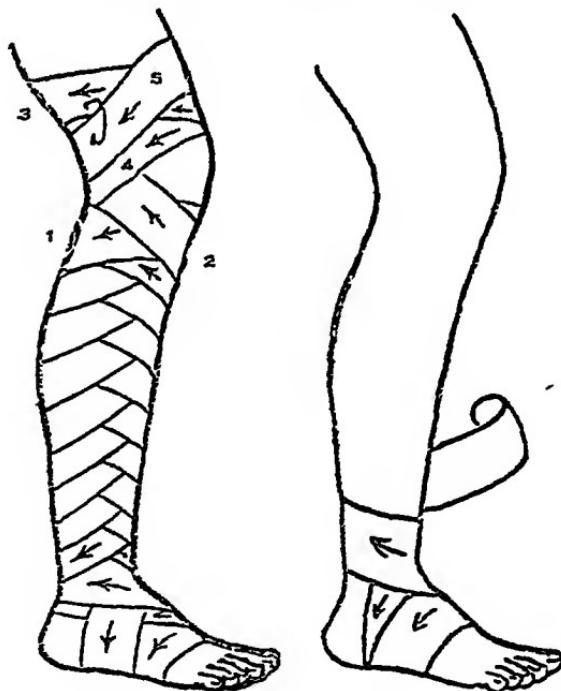


Fig. 205 Bandaging the leg and knee.

Take a 3 inch bandage and begin from inner side of ankle to outer side of foot ; then round foot ; round

FOUR-TAILED BANDAGE

ankle, then again round foot and ankle and thence up the limb by ascending figure of eight. Cover the length desired by repetition of figure of eight (Fig 205)



Fig 208 A four-tailed bandage

Bandaging the Knee.— Width of the bandage $2\frac{1}{2}$ to 3 inches

Course Commence from 1, to back aspect to 2 and again by posterior side as 3, then simple turn as 4, take a down course as 5 and finish now as far below as necessary (Fig 205)

Four-tailed Bandage for the Jaw.—Take 36 inches of a 4 inch bandage (Figs 206-7)

Cut it out at the middle about an inch in length and quarter half an inch in breadth. Tear the bandage down the middle to within 2 inches of the hole on each side. Apply the cut to the chin. Carry one pair to the back of neck, tie and carry the free ends up



Fig 207 Four-tailed bandage applied for the jaw

ACCIDENTS -

Carry the other pair over front of head tie and then fasten the loose ends with the two ends from the neck.

Bandaging Head with a Four-tailed Bandage —
6 inches in width and 2 feet and 6 inches in length will do Any part of the head may be bandaged with it.

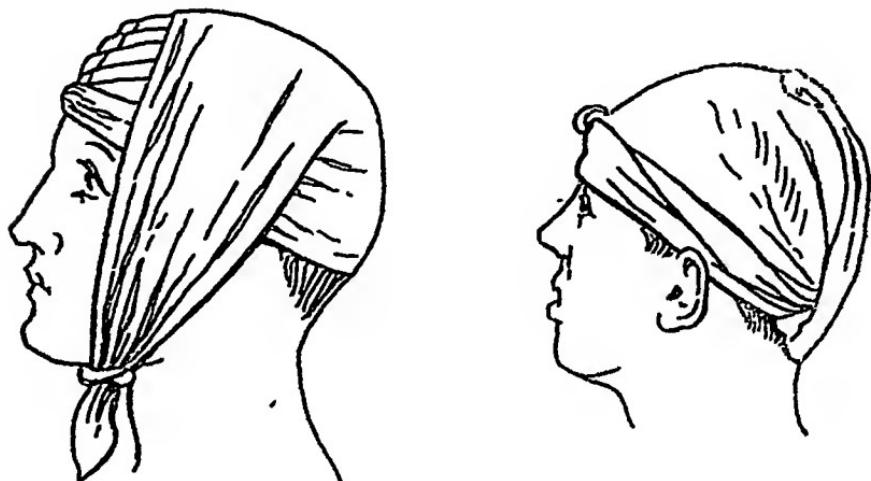


Fig. 208.

Bandaging head with a four-tailed bandage.

Tear the bandage at both ends in the middle leaving about a foot in the middle. Apply in a reverse way to that of jaw bandage. Put the middle portion on the head and carry a pair of ends to below the chin and other pair from back to front (Fig. 208)

POISONING

The first principle of treatment of poisoning is to remove the poison from the stomach by washing it out or by inducing vomiting so as to prevent absorption. In corrosive poisons such as carbolic acid and mineral acids etc. it may be dangerous to induce vomiting as in these cases the gullet and the stomach are so much injured that there is a danger of perforation. In such cases neutralise the poison or render it inert. Where the poison has already been absorbed, the physiological antidote should be given.

The patient's general condition must be carefully observed and every effort should be made to increase resistance to poison, until its effect has passed off. The heart should be strengthened with arjun. In cases where there is risk of asphyxiation, artificial respiration must be commenced early. Application of heat to the extremities may be useful in some cases. Rectal feeding may be necessary in some cases.

To avert severe depression or collapse intravenous saline may be necessary. Rectal saline also is sometimes very necessary. It has been found that in late cases where collapse has already set in and the nature of poison could not be ascertained general treatment alone gave wonderful result.

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Warm milk may be given to avert collapse where the patient is able to swallow. Where it is useful to induce vomiting, selection may be made from the list below :

Common Salt :—Half an ounce in 8 ounces of tepid water, repeated.

Mustard Powder :—Two drams in 8 oz of warm water, repeated.

Alum :—It is to be mixed with sugar or molasses and diluted. 3 drams alum suspended in 1 oz of sugared water may be repeated every 15 minutes

Copper Sulphate :—10 to 15 grains of copper sulphate in 4 oz of warm water. This should preferably be mixed with rice water (gruel) or barley water.

Soothing Drinks in Poisoning

Gruel water, barley water and milk are generally used. In corrosive and irritant poisoning white of egg may be given emulsified with water. Isafgul is a good demulcent. Any bland oil and gum emulsion are also useful.

Wash out the Stomach :—The stomach should be washed out with the help of a rubber tube. The process is described in the chapter on Nursing.

Aconite Poisoning

Aconite in big doses is a virulent poison. Though only the root is generally used, the whole plant is

ACONITE POISONING

poisonous. Generally aconite poisonings are accidental when it is mistaken for some other medicine or from injudicious administration of the medicine by internal route.

Symptoms :—Poisoning commences with a tingling sensation and numbness of the tongue and mouth. The respiration and pulse become slower and weak followed by general weakness of the body. Nausea and vomiting follow later with epigastric pain. Dyspnoea which ultimately comes in is a bad symptom. Pulse now becomes irregular and thready. The skin is cold and clammy, feature appearing bloodless. Gradually giddiness appears with weighty feeling of limbs and staggering walk, pulse gradually fails and respiration becomes rapid and shallow, the patient losing his power of hearing, vision and speech. Death is generally due to heart failure but the mind remains clear till the last.

Aconite induces vomiting. If the patient has not vomited, give him an emetic such as common salt in water. Empty the stomach by an wash-out also, if a stomach tube is available. Apply douche to wash out the colons. Administer a purgative in the form of 2 ounces of castor oil. Prevent collapse by saline infusion or rectal saline. Maintain strength of the heart by repeated doses of 30 grains of arjun. Maintain respiration. Milk may be given along with barley water or gruel as diet. Keep the patient in a recumbent position.

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Arsenic Poisoning

Arsenic is one of the most virulent poisons. For a variety of reasons it is very commonly used for murdering. It is a tasteless white powder and can be easily mixed with food without chance of detection. A very small quantity is fatal.

Arsenic acts as a virulent irritant poison and also affects the nerve centre.

It acts with irritating effect upon the mucous membrane of the stomach and intestines. The usual symptoms of irritant poisoning are epigastric and abdominal pain, thirst, vomiting, tenesmus, purging etc. later perforation of the stomach or the intestine may happen giving result to bloody stool. Symptoms due to irritating action on skin, liver and kidney etc are conjunctivitis, painful eruptions on the skin and desquamation of the cuticle, salivation, dysuria, suppression of urine leading to uræmic coma and jaundice. All these symptoms are likely to occur in arsenic poisoning. The nerve centre being affected, arsenic poisoning shows symptoms of collapse, the body being cold and pulse feeble. Numbness, tingling of the extremities and then paralysis may ensue. Convulsions, delirium and lock-jaw are some of the nervous symptoms. These deepen into coma, pulse sinks and death then ensues.

Slow or chronic poisoning by arsenic happens when arsenic is repeated in small but high doses for sometime. In chronic poisoning both the symptoms of irritant and

ARSENIC POISONING

nerve poisoning may appear. Sometimes one or other set of symptoms may be suppressed

Arsenic poisoning very closely resembles cholera. Vomiting, rice watery stools, cramps, suppression of urine are all common symptoms. Arsenic poisoning has these symptoms in common with ptomaine poisoning also but in ptomaine poisoning the temperature is raised and the pulse is regular, though quick.

Treatment of arsenic poisoning if commenced late is though not very satisfactory, the main principles of treatment are Elimination of toxins and use of antidote and counteraction of its effects.

To carry out elimination the patient should be given copious drinks of water followed by emetics. If emetics fail to induce vomiting, the stomach tube should be used but with very great care. The elimination should be complete. Before giving any emetic or introducing the stomach tube, it is better to give a demulcent drink in form of arachis oil or white of egg and water. Isafgul is to allay irritating effect. Ferric salt in suspended precipitation is an effective antidote of arsenic. If ferrous sulphate (Kasis or Hirakash) is available, it may be dissolved in water and boiled and aerated to convert into ferric state and then diluted with a solution of soda bicarb. Two ounces of feirous sulphate may be taken. The precipitate suspended in water should be given for drinking mixed with some common salt. Cold may be applied on the abdomen. Hot

ACCIDENTS

water bottles to the extremities may also be useful. Demulcent drinks which protect and allay irritation of the mucous membrane should be given copiously. Arachis oil and isafgul are good.

Salines are useful in averting collapse. Any route may be chosen. If diarrhoea or mucoid stool with blood cannot be controlled, starch enema (10 to 12 grains of opium, mucilage of starch 2 oz well emulsified) should be given. When all acute symptoms disappear, this enema works nicely to ensure complete rest of the patient

Arsenic is extensively used for poisoning cattle for the sake of their skin. Arsenic is mixed with ghee or molasses and put in a plantain leaf where the cattle graze. Arsenic mixed with flour is dusted on grass in pastures.

The animal becomes suddenly ill, is seized with a trembling fit, has severe abdominal pain, strikes the belly with the hind legs or horns and looks frequently round to the flanks, foams at the mouth, has great thirst, very often shows tetanic twitchings and signs of panting. Diarrhoea sets in with or without blood. Death generally occurs in 2 to 4 hours depending on the amount of poison administered.

As soon as detected one or two seers of til, sesamum or linseed oil should be poured down the animal's throat. The dose is repeated every hour.

Preparations as described above should also be given in big doses

COPPER SULPHATE POISONING

Diet should be linseed gruel, bran mash, isafgul in water and boiled rice. Dry grass or straw should not be given for 2 or 3 days

Copper Sulphate (Blue Vitriol)

If copper sulphate is taken by mouth in big doses it causes severe vomiting which sets in almost immediately after being taken Copper sulphate is an effective emetic In over doses it acts as a poison

Symptoms are salivation, metallic taste and smell followed by severe gastro-intestinal irritation and uncontrollable vomiting with griping The vomited matters are usually bluish or greenish Late symptoms when the case is severe, are giddiness and headache followed by delirium Convulsions, sometimes violent may be followed by paralysis and later insensibility Pulse becomes very rapid Suppression of urine is not uncommon Jaundice is a fairly constant symptom Ultimately it terminates in coma and death

Fatal period is usually about 3 days The fatal dose varying according to constitution up to one ounce.

Vomiting usually accompanies No emetics are therefore required Stomach tube may be used for washing before which large doses of white of egg or milk should be given Arachis oil or isafgul also may be given as demulcent Opium may be given later to induce rest and sleep A warm poultice over the abdomen is useful

ACCIDENTS

Datura (Belladonna)

Datura seeds are mixed with cannabis indica to increase the intoxicating effects of cannabis. They are also mixed with Indian hemp to increase its intoxicating effect as is used by the *Kavirajas* in the form of *modaka*. Cheats often use it to poison travellers and passers-by. Powder of the datura seeds is mixed with several sweets. The person falls unconscious and his property is robbed without killing him outright.

The primary symptom is dryness of the throat, this is followed by giddiness and staggering as if intoxicated, flushing of the face and delirium with widely dilated pupils follow gradually. Dryness of the throat increases and swallowing becomes difficult. Vision becomes indistinct or disordered. Hyperpyrexia is often produced rising even up to 106° to 108° F. Skin is flushed. Purging is also sometimes present but very late. The patient goes through some peculiar movements, appears to grasp at imaginary objects, picks at his clothes or bedding and often appears to be trying to pull imaginary threads out of the ends of his fingers. These symptoms either gradually disappear or give place to convulsions and coma, followed by gradual failure of the heart and respiration and death.

Vomiting should be induced by emetics followed by strong purgatives. Catheters be passed if urine is retained. If there be high temperature, wet packs

DATURA NUX VOMICA POISONING

and cold stream of water on head and body should be given Collapse should be treated by warmth to the extremities and respiratory failure by artificial respiration Morphine may be given in case there be extreme restlessness Arjun is the best cardiac stimulant and should be given if the patient can absorb anything through the stomach

Nux Vomica (Strychnine)

Half a dram of nux vomica seeds taken at a time is enough to produce poisoning symptoms It acts directly as a spinal stimulant causing tetanic spasms and death either from asphyxia due to spasm of the muscles of respiration or from collapse

There is a feeling of suffocation and the face becomes lurid Tetanic convulsions set in resembling an attack of tetanus except in some details In tetanus jaw is locked early , in nux vomica it comes late The neck is drawn back and the body may get so curved as to rest on head and heels Slightest irritation, talk or touch may cause the convulsive fits to be repeated The eyes stare Hearing and sight remain acute and consciousness is retained all through Ultimately the jaw gets locked

Nux vomica is a deadly poison The stomach should be emptied by vomiting with the help of any available emetic and the stomach tube should be used to wash out the stomach

Tannin in the form of cutch in half dram doses should be given followed by vomiting or wash-out

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Sedative in the form of opium should be given to soothe convulsions. Bromides if available are useful, so also chota chandra.

Artificial respiration should be attempted in respiratory failure and the extremities are to be kept warm. Absolute quiet in a dark room is essential.

Opium Poisoning

Next to hanging, it is one of the most adopted means of suicide. In empty stomach it works rapidly than if taken when the stomach is full.

There are headache, weariness and sleepiness. Diminution of sensibility occurs and pupils contract to pin point and later have no reaction and towards death they may be widely dilated.

The face becomes pale or cyanosed and the skin becomes cold

Pulse may be natural or quickened. Afterwards it is usually slow but becomes small, quick, and irregular as death approaches. Respiration gets slow, irregular and stertorous.

Muscular relaxation accompanies from the first state generally. Coma and shallow respiration precede death.

Vomiting and purging, tetanoid convulsions and lock-jaw and (more often in morphine poisoning) paralysis are also observed in rare cases. It is difficult to induce vomiting in opium cases as opium itself is a strong antiemetic Wash-out of the stomach

OPIUM POISONING . OLEANDER SEEDS

with the help of a stomach tube should be thoroughly done.

Potass permanganate neutralises opium It should be given in solution of 1 grain to the ounce in copious quantity and washed out till there is no opium smell in wash-out water If no stomach tube is available, the patient should be given large doses of permanganate solution and his throat should be trickled to induce vomiting Copper sulphate should be used in place of permanganate, if it is not available Mustard or common salt in copious warm water may also be used to induce vomiting

The patient should be kept awake, without exhausting him by walking , The patient may be pinched or given blows in order to be kept awake The extremities should be kept warm When respiration fails, Silvester's method of artificial respiration should be attempted Atropine sulphate gr 1/50-1/100 in solution if available, should be hypodermically administered to counteract opium

Oleander Seeds

Oleander seed is commonly used for suicidal purposes in villages It is generally taken ground and made into a paste with molasses

Vomiting and frothy salivation occur followed by restlessness Pulse becomes slow and weak, respiration hurried, muscular twitching of upper extremities deepening into tetanic spasms gradually follow.

812 HOME AND VILLAGE DOCTOR : CHAP. VIII
ACCIDENTS

Lock-jaw is frequently present Drowsiness passing into insensibility and collapse. Diarrhoea is absent.

The contents of the stomach should be thrown out by emetics and other symptoms should be treated as they arise

Stimulate by using nux vomica. Keep the heart strongly active by arjun Begin artificial respiration when breathing is lowered.

Mercury Salt Poisoning

There may be poisoning from salts of mercury in the form of *Sindur*, the red pigments or calomel or corrosive sublimate. Corrosive sublimate is a virulent and irritant poison quickly eating away the intestinal walls.

On poisoning by mercury pain appears in the stomach. Vomiting and purging may contain stringy mucus and blood. The tongue gets white and shrivelled, pulse becomes feeble and rapid which slows down later on. Urine is suppressed and in graver case coma is followed by death.

The patient should be given large doses of demulcent drink and egg albumen mixed with milk Starch opium enema (10 grains per 2 ounces of starch gruel) should be given to soothe. Arjun in 30 grains doses should be given to maintain strength of the heart.

If enteritis follows treat it accordingly guarding perforation.

PTOMAINES OR FOOD POISONING

Chronic cases of mercury poisoning are manifested by debility, nausea and vomiting with colicky pain. Prolonged salivation without any other visible cause is a predominating symptom. In some cases tremors may be present.

Saline may be indicated in collapse or perforation of intestines and bleeding.

Ptomaines or Food Poisoning

Ptomaines are confined to animal alkaloids as a resultant of putrefaction of fish or meat.

The symptoms are vomiting, purging, colic, headache, great muscular weakness, brown coating of the tongue, raised temperature and severe collapse with quick pulse. It is generally mistaken for cholera. Treatment also be as for cholera by salines, fractional doses of calomel, soda bicarb and other stimulants.

If it can be detected from the very onset then strong purgatives are best. Collapse should always be guarded against by keeping the heart stimulated by administration of aijun. The extremities should be kept warm by hot water bottles.

CHAPTER—IX

CHEAP REMEDIES (THERAPEUTIC GUIDE)

Preface

The Cheap Remedies was written in 1934 to present village practitioners with a concrete list of medicines with their uses, so that where medicines have to be used, expenses might be minimised to make or obtain them. There are many inexpensive items which, when they emerge through the doors of a dispensary, become expensive. The Cheap Remedies served its purpose and some workers are more and more using drugs mentioned in the book with profit to the patients.

But the book was not complete in itself. One could not learn how to deal with diseases from that book. There was therefore a demand for a book which will help the treatment of diseases along with the existing book "Cheap Remedies."

The present volume Home and Village Doctor fulfils that purpose. In this volume chapter VI is on Home Treatment of Symptoms. The treatment outlined there has been confined to only 24 items of drugs (See page 453). These have to be described and they will be found in this chapter. In addition to these few items, other drugs are described in the

PREFACE

following pages, the help of which has been taken in the subsequent chapters for treatment of various diseases

Only a few drugs have been included in this class. It is to be understood that these are not the only drugs available or that these are the best drugs and that no better choice could be made. We had experience of healing patients with these drugs and we could rely on them for their healing properties and therefore they are here. They are well-known also. In choosing, their character for being made into tablets, their availability, their suitability for village use etc had to be considered.

With regard to these drugs it may be said that they are likely to serve the purpose of the village doctor quite well. Some observation is necessary with regard to mode of administration of the indigenous drugs. They are powerful medicines and the best way of administering them is to powder them minutely and give them directly to the patients. But here difficulty comes on. They cannot be kept indefinitely in a powdered form and in fact the greater the pulverisation, the quicker the deterioration. This situation may be met by supplying the drugs without powdering them. Powdering is difficult to be done then and there for each prescription as the operation involves sometime. It has therefore to be left to the patient's people to do the powdering.

But the tendency now a days is for getting things ready from the dispensary. So, if the patient or his

CHEAP REMEDIES

men are saddled with the task of grinding, the medicines may not be used at all. It is therefore advisable to prepare the drugs and keep them ready for dispensing. Powdered drugs may be stored without deterioration by compressing them into tablets. The art of making tablets has therefore to be learnt. The most expensive part of the equipment is a tablet-making machine. It is now manufactured at Calcutta and may be had for Rs. 130/- or about. The capacity of these small machines, is very great. When worked at speed, as many as a hundred tablets may be made per minute. 40 to 60 tablets per minute is however an average speed. For facilitating dispensing chemicals also are recommended to be kept in compressed tablet forms. Ampoules also are indicated to be used. Their manufacture involves careful measurement and still careful manipulation and these have to be learnt.

Preface to the first Edition

This book is the outcome of a series of experiments in pharmaceutical processes carried on with the object of cheapening remedies. While engaged in Harijan service I was trying to provide a place of treatment for the poor. Gandhiji at this time drew my attention to the greater problem of supplying them with cheap remedies.

I found that if tablets were made from drugs they could very materially cheapen treatment. I

PREFACE TO THE FIRST EDITION

felt also that the ampoules for injections could be sold at about one-fourth their current market prices

I consulted my friends in the pharmaceutical trade about cheapening their tablets and ampoules I understood their difficulties which are real Then I had to take up my old profession of a chemist and pharmacist for the time and go to the length of preparing tablets and ampoules and arrange for training of those who would take up the work for cheapening remedies

While finishing my task, I have come across certain passages in the "Indigenous Drugs of India" where I find that the author Dr. R N Chopra, I M S of the Tropical School of Medicine has anticipated me He gives examples of crude drugs being as efficacious or even better than their purified extracts "Such examples" he writes, "could be multiplied It should be possible to prepare tablets from many of the indigenous drugs which could be sold at a very cheap rate Attention to this subject is of great importance to this country because economy and low cost of advice and treatment are of paramount importance to any plan of medical relief that can hope to succeed in this country "

I hope this little book together with the arrangements for training men in the art of manufacturing tablets and ampoules will go some way towards cheapening remedies

Calcutta, March 1931 SATISH CHANDRA DAS GUPTA.

CHEAP REMEDIES

Introductory

Present High Costs

Treatment of ailing persons has become expensive. While the fees of physicians have gone up, the chemists have not lagged behind. Dispensing rates have been high and to delude the patients and physicians a class of medicines are being popularised under fancy names which cost little but bring extraordinary profits. The poor man has to pay for these costly medicines and treatment or to depend upon ignorant persons who sometimes do more mischief than good. Low scale of fees for physicians and cheap remedies are needed.

As regards remedies, in some cases the cost increases by the very nature of the process of manufacture and dispensing. Drugs are extracted with alcohol and are generally preserved with alcohol. Alcohol is a very costly material. Nine-tenths of the price of the medicinal alcohol goes to the government which levies enormous excise duties on it.

Then again fluids have to be kept and transported in glass containers which are not only heavy but also costly and require costly packing. The appearance and getting up fill a place in pharmacy which exact no small toll on the purse of the consumers. The labels must be attractive, the phials and cartoons and other details of packing must be such as to give an excellent finish to the article. The middlemen and the retail chemists also must have their margin.

INTRODUCTORY CHEAPENING BY TABLETS

for handling the preparations This is how the preparations get costly apart from the profit the manufacturers want to keep

Cheapening by Tablets.

All these points are however connected as in a chain. If some method of preparation of drugs without alcohol is found in which we have to deal with solids then the problem is largely solved Such a solution has been found in the choice of tablets, as a form for administration of drugs. Take for example, the case of digitalis Digitalis leaves are extracted with alcohol The extract deteriorates with time and even at time of dispensing the addition of water to the tincture causes decomposition Leaves in powder form are accepted as fit for administration If we take the leaves of digitalis and powder and compress them we at once get a preparation which is as efficient as tincture of digitalis and which keeps the active principles better in their original condition. The omission of alcohol saves the cost of preparation, saves major part of the cost of packing and transport also If we take such drugs as vasaka, kalmegh, kurchi, nux vomica etc., we shall find that similar other considerations hold true

If the drugs have to be administered let them be used in raw state as tablets Instead of using the tincture, say of aconite, we may use tablets or powders of aconite root which is more powerful than

CHEAP REMEDIES

the equivalent quantity of tincture made from it. Aconite in the form of fine powder is as quick in its action as the corresponding tincture. If a tablet of $\frac{1}{2}$ grain of aconite root is put on the tongue, in two or three minutes the specific action of aconite, namely tingling and numbness will begin to be felt, whereas 5 drops of tincture equivalent to the tablet, if placed on the tongue will not produce such marked results.

The parent substances however, in case of most of the vegetables are very cheap being ordinarily only a few annas per pound. All that is necessary is to powder them and after mixing them with a proper medium, compress them into tablets.

There is no danger in using crude drugs as they are. Where the parent substance contains some objectionable element then elimination of that element will mean purification. But the mere extraction of the alkaloid in the purest form is hardly a purification process. It has been found in many instances that the pure chemical substances made from the crude drugs are not as efficient as the drugs themselves or are otherwise unsuitable. Kurchi provides an example. Kurchi is a specific for dysentery. Kurchi gave an alkaloid which was expected to be as powerful as kurchi only in a more concentrated and assimilable form. But further researches showed that purification of the alkaloid has diminished the efficacy, as those other alkaloidal substances which were regarded as useless are of real

CHEAPENING BY TABLETS CHEAP QUININE NEEDED

value also. Similarly in the case of quinine. There are several alkaloids in cinchona bark out of which quinine alone used to be prized hitherto while other alkaloids were relegated an inferior place. Even to-day cinchona bark is valued on its quinine content and not on its total alkaloid content. But recent researches have clearly shewn that the other alkaloids or the residual alkaloids left after extraction of quinine are as useful as quinine itself.

In the case of chaulmugia oil it has been proved that the ester of the pure hydnocarpic acid is inferior to the ester of all acids in the oil.

The separation of a pure chemical substance from a drug is therefore no purification. In selecting the drugs, this fact has been borne in mind and those have been selected where substances themselves do not call for a separation in order to improve their chemical component.

Cheap Quinine Needed

Quinine is one of the most useful items in connection with the treatment of the poor. Quinine production and marketing all over the world are controlled by a syndicate called "Kina Bureau". This bureau believes in making high profits by exclusive operation and in maintaining the high rates by creating the supply artificially limited. It fixed the price of quinine at Rs 18/- per pound in 1926 and though there have been trade slumps and many

CHEAP REMEDIES

changes in world finance and currency, the price of quinine has remained unchanged. The Government of India obeys the mandate of the Kina Bureau and sells its product at the Bureau prices. Large stocks of quinine are held up and areas under cultivation are being reduced in certain parts of the world while thousands of men are dying a preventable death from malaria for want of cheap quinine in India. India could break away from the syndicate, could not only meet her entire demand of quinine but supply other countries also with quinine by extensive cultivation of cinchona plants. But the Government does not feel inclined to change its policy.

So in spite of our efforts to cheapen remedies one of the most important remedies, namely quinine and cinchona products will remain amazingly costly.

Cheap Chemicals in Tablets

If we pass on to the mineral kingdom the results are no less striking. If we make tablets of these they may be easily served out to patients without the intervention of a dispensary. Chemicals may be powdered and put into tablet forms at a nominal cost and thereby reach the consumers with but slight additions over the original cost of substance. For example, take the case of soda bicarb. This can be had for two annas a pound. One pound contains 7000 grains, and if per dose 20 grs. is administered we can have 350 doses of soda bicarb for two annas.

CHEAP CHEMICALS DRAWBACKS OF TABLETS

or about 50 doses per single pice. And if one anna is charged as cost of making a hundred tablets then we can have 350 doses of soda bicarb for about six annas. In the same way ajowan tablets, which are favourite tablets in Bengal can be sold at a nominal price. As they come out of the machine they would probably cost only one rupee per 800 tablets or two annas per 100 tablets.

If these tablets are put up in tins or card board boxes both weight of packing and cost of container can be reduced to a minimum, making it possible to reach the tablets to the homes of the poor at a nominal cost.

Drawbacks of Tablets

By avoiding therefore liquid preparations and the method of dispensing them in form of mixture either suspended or dissolved in water, we save money and trouble and cheapen medicines.

There is however one difficulty in the administration of tablets. 60 drops of a liquid preparation may be easily taken by a person on diluting it with an ounce of water. It is not so easy to swallow 60 grains of solids in 6 tablets. They have to be swallowed one by one or they have to be powdered in a mortar and swallowed in suspension with water. This difficulty however, should not stand in the way of introduction of tablets.

CHEAP REMEDIES

Cheapening Ampoules

We have seen that by restricting ourselves to the use of tablets wherever possible for oral administration, we not only save cost incredibly but in some cases increase the efficiency also. Similarly, if we adopt the method of injection we get best results also at a cheap cost. The chemicals from which ampoules for injections are made are quite cheap. It is the novelty of the thing that has permitted the ampoules to be sold at the present high rates. What is there in a 1/60th gr strychnine ampoule that it should be sold for four annas each? One can get a dram of strychnine for six annas and it will give 3600 doses or as many ampoules. The cost of ingredient therefore disappears. Then comes the cost of empty tubes of ampoules and sealing, the cost of card board case, the commissions to the distributors etc. In case of ampoules made from chemicals with the exception of a few like quinine, emetine or ephedrine the whole cost is practically the cost of getting up and distribution. One therefore can make and use ampoules freely and at no more cost than a dose of ordinary medicine. Injection is a very efficient way of administration of drug within its limits. Only the ampoules are to be prepared and taken to the bed-side of the patient at their legitimate cost. Any enterprising pharmacist may take up this line of work and instead of dispensing in phials may make ampoules for injection. Ampoules of course, require special precaution in manufacture but there is no reason why they should be sold at the rate they are now done.

CHEAPENING AMPOULES LIMITATIONS OF DRUGS

I have indicated what the reasonable rates for the tablets and ampoules are, in a schedule. If these articles are to be distributed really cheap the final packing should engage the attention of the distributors. We may not make appearance and finish unnecessarily costly. The ampoules may be put up in tin cases, a dozen or two together at a nominal cost. Treatment with the help of tablets involves a change in the method of administering the drug but treatment with the help of ampoules involves no such change.

Limitations

There is one thing more. He who wants to supply cheap remedies to poor patients must also have to restrict his choice of drugs. It would be advisable to have a selection made from the well-known drugs so that the number may be reduced and thereby the manufacture and storing of the tablets be made easy. In the following pages I have restricted myself to deal with a limited number of remedies for the common diseases and have thereby indicated the building up of a Pharmacology of Cheap Remedies from vegetable and mineral sources. I have for other considerations not touched animal products. The number of remedies in tablets in spite of a desire to keep it low has gone up to about 50 and ampoules to nearly 20 and there are nearly 20 other items in fluids and ointments.

CHEAP REMEDIES

The book itself is not a mere catalogue. First of all the remedies had to be selected keeping in view efficiency, cheapness and permissibility of the drugs being made into tablets or ampoules. Discretion had to be used not merely in the choice of the drugs but also in the mode of preparing them. On going to make tablets difficulty comes in. For example, cinchona febrifuge when compressed along with some medium to keep the grains in adhesion becomes a stiff hard body which is likely to be thrown out entire with stool. There is a somewhat resinous substance which repels water and by a little warmth such as that of the body, it becomes more resinous in character and therefore more repellent to water and less likely to be disintegrated. To avoid this, citric acid has been mixed with cinchona first and then made into tablets. These tablets now dissolve easily in water.

The process of selection was necessarily a slow one as besides those included many more tablets and ampoules had to be made and difficulties studied for the selection.

Indigenous Drugs in Selection

India possesses so vast resources of medicinal herbs and plants that this class of remedies may conveniently be restricted to those of Indian origin. Some imported chemicals and vegetable products have been included also. The following is a brief analysis of the remedies included in this book.

INDIGENOUS DRUGS VALUE OF RESEARCH

I Indigenous and Bazar Herbs and Products

Afim, Ajowan, Arjun, Bael, Bala, Bish, Caffeine (chemical), Chota Chandra, Chaulmugra, Cinchona, Datuia, Ephedrine (chemical), Eranda, Eucalyptus, Harra, Hing, Isafgul, Kalmegh, Kuchila, Kurchi, Lasan, Mungphali, Papaya, Punarnava, Turpentine, Ulat Kambal, Vakuchi, Vasaka

II Indigenous Mineral Products

Ammonia, Fatkiri, Harital, Mag Sulph, Makaradhwaja, Morphine, Nishadal, Paraffin. Sankha Bish, Sohaga, Tutia

III Imported Vegetable and Mineral Products

Atropine Sulphate, Bismuth, Calcium Lactate and Chloride, Calomel, Camphor, Creosote, Digitalin, Emetine, Iodine, Picric Acid, Potass Bromide, Iodide and Permanganate, Soda Bicarb, Salicylate, Sulphur, Tartar Emetic

Value of Research

In the domain of indigenous medicines there are jewels mixed up with tons of rubbish. It is necessary to investigate and reject the useless ones. Of late such work is going on in the Tropical School of Medicine and other research laboratories and considerable research work has been done.

As a result of these scientific investigations new properties are being found in old remedies while

CHEAP REMEDIES

many reputed medicines are being found to be useless I have closely gone through the research results obtained by eminent workers on this line at the present moment. Most of the herbs and drugs included in this selection have been under investigations, chemically and physiologically and have been found to be useful

These researches have cleared up many doubtful points For example, makaradhwaja which is an insoluble sulphide of mercury held so highly in repute by the kavajas, was looked upon with suspicion by scientific men But recent researches have indicated that mercury in the sulphide form in minute division is assimilable and that it acts as a stimulant and otherwise affects patients beneficially.

Trial

Among the patients in several *bastis* of Calcutta and in the Sua outdoor dispensary attached to the Harijan Hospital, these tablets and ampoules are being tried with great success. When patients are treated with the help of these remedies including injections the costs have been seen to work out at one-fourth anna per day per patient.

Future

With some skill and perseverance the art of making tablets and ampoules may be learnt Benevolent organisations may undertake this work. The Khadi

ACKNOWLEDGMENT

Pratisthan will be prepared to train men in tablet and ampoule making, sent by benevolent bodies for the purpose. The minimum capital outlay will be about Rs 300/- in the beginning. The chief item of cost being the tablet-making machine worth about Rs. 130/- Drugs, chemicals and other accessories may be got for another Rs 170/- The tablet machine referred to can turn out 60 to 100 tablets per minute. Benevolent bodies running dispensaries may make their own tablets and ampoules and also help sister organisations.

All the hundred remedies with hypodermic syringe etc, may be carried conveniently in a small hand bag which when filled will weigh 7 to 8 pounds. Such a bag will hold medicines for treating 50 persons on the average. It may be daily refilled.

Acknowledgment

In compiling this book I have taken materials from well-known authors like Squire, Hale-White, Davis, Majumdar, Dr Chopra, Warren, Dr K C Bose and others. I have also taken materials from the literature published by manufacturing pharmacists such as the Bengal Chemical & Pharmaceutical Works Ltd, Burroughs Welcome & Co, Parke Davies & Co etc.

Dr Indra Narayan Sen came out of jail in time for seeing the manuscripts before they went to the press. With his usual zeal to help me he went

CHEAP REMEDIES

through the manuscripts and made suggestions which have been incorporated. I am not a little relieved in being able to share the responsibility with such an eminent co-worker.

To Physicians

I do believe that those physicians who will try to build up treatment within the limits of the cheap remedies indicated will find their task a joyful one. Although there are only a hundred remedies it may be felt to be an advantage instead of a handicap from one point of view. There are literally thousands of remedies in both the Eastein and Western systems of medicines. Their very number is puzzling. Restriction in such a case may be welcomed as helpful. Physicians may reject some of them and replace them by others which they consider to be more useful. The list however, in my opinion is fairly a long one and comprehensive. The four poisonous heavy metals, bismuth, antimony, arsenic and mercury are there. What service have they not rendered to the suffering humanity? They are like the four *digpals* in the garden of healing. They have cured and continue to cure most baffling diseases. Syphilis, kala-azar, anaemia are scared away at their appearance.

Then there are the vegetable poisons,—Aconite, nux vomica, opium, digitalis and datura. These are like snakes to ordinary men. But the right

TO PHYSICIANS

type of physician is a snake charmer! He charms these poisons Pain and weakness of the heart and lungs disappear at their touch and even old asthma frowns and leaves the sufferer to enjoy the blessings of health

And where can dysentery, diarrhoea, dyspepsia stay with bael, kurchi, emetine and papaya helping the physician? To ward off the demons of pneumonia, phthisis and typhoid there are garlic, vasaka, thymol and creosote while no rheumatics and neuralgics need despair when there are the salicylates, caffeine and hing But I do not propose to take the reader through the whole of this small but neat and lovely garden of healing I hope, physicians will find many points of beauty in this garden, where they will lead the sufferers on to heal them and inspire them with faith to utilise the healed body for service to God and humanity

SATISH CHANDRA DAS GUPTA

INDEX OF DISEASES AND TREATMENT

Abortion (Threatened)

Asafœtida, Opium, (Morphia). Absolute rest

Albuminuria

Iodides, Iodine, Tartar Emetic, Digitalis and
alkalies Saline Purgatives—Mag. Sulph, Soda
Bicarbonate, Punarnava

Hot packs in blankets Restrict fluid and salt

Amenorrhœa

Asafœtida, Iron, Potass Permanganate

Anæmia

Arsenic, Iron, Mag. Sulph, Merc-Sulphide (See
Tonics in therapeutic classification)

Angina Pectoris

(Pain in heart)

Arjun (Cardiac tonic), Arsenic, Caffeine and its
compounds with Soda Salts, Camphor, Datura,
Digitalis, Iodides, Opium (Morphia), Carminatives
Treat constipation and flatulence

Apoplexy

Drastic purgatives, Calomel, Nux Vomica, Saline
Enema.

INDEX OF DISEASES AND TREATMENT

Asthma

Arsenic, Bala, Camphor, Calomel, Datura, Ephedrine, Garlic, Iodides, Oil Eucalyptus, Pot Bromide, Vasaka. Restrict to light food.

Beri-beri

Arjun, Calomel, Digitalis, Nux Vomica, Punarnava, Soda Salicylate, Saline Purgatives.

Diet : Foods containing vitamin "B". Unpolished rice, Green Vegetables, Tomato. No sudden exertion.

Bites

Insect, Animal and Snakes.

Acetic Acid, Alum—both internal and external, Ammonia, Citric acid, Pot. Permang (snake), Soda Bicarb for wasp, Tinct Iodine

Bronchitis

Aconite, Ammon Chlor, Asafoetida, Camphor, Datura, Garlic, Iodine, Eucalyptus, Myrobalan, Pot Bromide, Soda Bicarb, Thymol, Emetics, Turpentine, Vasaka

Hot moist air from tea-kettle by adding oil eucalyptus.

Burns and Scalds

Immediate — Carron Oil (well shaken equal parts of lime water and cocoanut oil) 1st degree, Moistened dressing of Soda Bicarb Late—Dusting powder 2nd degree—Open vesicles and bullæ Lotio Acid Picric 1%. Keep the dressing moist. Remove

CHEAP REMEDIES

with warm Boric lotions. 3rd degree—Same as 2nd degree. Later on use Boro Vaseline or Picric Acid ointment. 4th & 5th degrees—Treat shock with Arjun, Digitalis and strychnine, remove clothings with antiseptic lotion. Later antiseptic light dressings

Colds

Ammon chlor. Camphor, Cinchona, Datura, Inhalation of eucalyptus oil, Menthol, Myrobalan, Influenza tablets and Soda bicarb

Cancer, Carbuncle, Boils

Copper Sulphate, Iodine, Mag. Sulph, Opium. General. Arsenic with Nux vomica, Calcium, Iron, Salines.

Cystitis

(Inflammation of the bladder)

Datura, Isafgul, Soda Bicarb. Fomentation and rest. Demulcent drinks.

Cholera

Asafœtida, Bismuth, Castor Oil, Fractional doses of Calomel and Soda Bicarb, Digitalis, Iodine and Menthol for hiccough. Opium, Saline injection. Kaolin or Clay

Colic Intestinal

Asafœtida, Bromide, Calomel, Datura, Garlic, Mag. Sulph, Opium, Papaya, Saline purgatives, Soda Bicarb, Thymol.

INDEX OF DISEASES AND TREATMENT

Conjunctivitis

Alum, Boric Acid, Copper Sulphate and Saline

Constipation

Arachis Oil, Bael, Datura, Isafgul, Myrobalan, Mag Sulph, Nux Vomica, Oils of Castor and Turpentine

Convulsions

Asafœtida (Enema), Pot. Bromide, Purgatives, Datura (Belladonna), Iron and Cardiac tonics

Cold water on head and tepid water bath of legs up to the knee.

Delirium

Camphor, Bromides for sleep, Datura. Cold water sponging

Diabetes

Acid Arsenious, Opium, Soda Bicarb, Soda Salicylas, Pot Permang.

Restricted diet. Sugar and starches to be avoided

Diarrhœa

Alum, Bael, Bismuth, Calomel, Cinchona, creosote, Isafgul, Kalmegh, Opium, Soda bicarb, Soda Salicylas and Thymol

Diet. Barley water

CHEAP REMEDIES

Diphtheria

Nux Vomica, Papaya juice paint. Soda Bicarb, Garlic for gargling and syringing. Stimulant injections.

Dropsy

Arjun, Caffeine, Calomel, Digitalis, Iron, Myrobalan. Purgatives. Sulphate of Magnesium. Punarnava. (See Albuminuria)

Dysentery

Alum, Arsenic, Bael, Castor oil. Emetine Hydro, Garlic, Kurchi, Opium.

For Bacillary dysentery : Saline purgatives in the form of Mag. Sulph 2 drams given every 1 or 2 hours in the beginning and then increase the interval gradually. Datura tablets for antispasmodic action.

KURCHI however is ideal in all sorts of dysenteries. Use isafgul freely.

Dysmenorrhœa

(Painful menstruation)

Camphor, Datura, Potass Bromides, Laxatives, Ulat Kambal.

Light exercises. Hip bath in tepid water. Mud poultice over the pelvis

Dyspepsia

Asafœtida, Arsenic, Bael, Bismuth, Garlic, Isafgul, Myrobalan, Nux Vomica, Papaya, Soda Bicarb, Soda Salicylas, Thymol

INDEX OF DISEASES AND TREATMENT

Eczema

Arsenic, Chaulmugra, Pot. Permang, Sulphur

Elephantiasis

Arsenic and Cinchona if fever, Inject Potass Antim Tart

Epilepsy

Ammonia Inhalation, Borax, Datura, Potass Bromide Liquid diet and absolute rest.

Epistaxis

(Bleeding from nose)

Nasal douche of Alum, Potass permanganate or Common Salt In severe cases Bismuth Gauze plugging Internally Calcium Salts and Bromides for sleep Constant cold on forehead.

Erysipelas

Aconite, Iodine Saturated solution of Mag. Sulph for cold compress

Keep bowels free Avoid hot fomentations.

Fainting

Ammonia for inhalation. Rest. Liquid diet and off from noises

Fever Malarial

Arsenic, Caffeine-aspirin tablet, Cinchona Febrifuge, Kalmegh, Potass Antim Tart, Soda bîcarb, Vasaka

CHEAP REMEDIES

Fever Typhoid

Arjun, Asafœtida, Datura, Garlic, Iodine, Calomel (1st, 3rd or 4th days), Sulphur, Thymol.

Drink : Soda Bicarb For tympanitis—Turpentine. If haemorrhage Calcium Lactate. Copious fluid to drink.

Gallstone

Arachis oil, Datura, Mag. Sulph, Sodium Salts. For chronic cases Kalmegh, Ammon chlor etc. Emetine Hydrochlor for injection

Reduce fat in diet. Keep bowels free. Do not load the stomach full. Frequent meals are good but lesser quantity.

Gonorrhœa

Alum, Boric acid, Calomel, Datura, Isafgul, Potass Permanganate and Soda Bicarb.

Hot baths. Copious fluids. No exercise and no alcohol. Rest and free purgation by saline purgatives.

Gout

Ammon Chlor, Arsenic, Calomel, Chaulmugra, Datura, Iodine. Soda Bicarb, salicylates, cardiac tonics, free purgatives and bromides are essential.

Local application—Aconite paint and Mag sulph injection also Caffeine Soda Salicylate injection.

Headache

Ammon Chloride, Menthol, Myrobalan, Bromides, Purgatives and Salicylates. Caffeine aspirin tablets. Counter irritant on forehead.

INDEX OF DISEASES AND TREATMENT

Heart Disease

Arjun, Camphor, Caffeine and Digitalis

(See Angina Pectoris and Cardiac tonics)

Hæmorrhage

(See also Epistaxis and Menorrhagia)

Alum, Calcium Lactate, Copper Sulphate, Oil Turpentine, Pot Permang, Iodine and all astringents

Herpes

Dusting powder —

Borax	...	50
Starch	...	50
Camphor	...	4

Arsenic and Iron tonics. Treat fever with Aconite, Cinchona, Nux Vomica etc

Hiccough

Calomel, Iodine, Oil Turpentine, Soda Bicarb and Calomel in fractional doses Saturated solution of Menthol in Alcohol in 2 minims doses Clear the bowels by free purges. Later alkalies, salicylates and bromides to induce sleep.

Hysteria

Bromides, Camphor and Chota Chandra

(See also convulsions and epilepsy)

CHEAP REMEDIES

Incontinence of Urine

Datura, Opium, Papaya (if due to dyspepsia), alkalies, anthelmintics if due to worms, Purgation by Castor Oil.

Inflammation

Aconite, Arjun (of heart), Hexamine (of bladder), Emetine (of liver), Iodine (gland), Calomel, Datura and saturated solution of Mag. Sulph.

Insomnia and Insanity

Chota Chandra, Opium and Bromides. For Insanity: Chota Chandra.

Influenza

Camphor, Cinchona, Digitalis, Menthol, Oil Eucalyptus, Quinine, Sodium Salts, Thymol, Influenza tablets.

Itch and Scabies

Soda Bicarb, Sulphur both internal and external, Arsenic and quinine as tonics.

Mag. Sulph for purgatives. Also Castor oil. Potass Permanganate for washing in hot water.

Jaundice

All alkalies, Ammon chlor, Bael, Kalmegh, Myrobalan, Nux Vomica, Papaya, Saline Purgatives, Calomel, Soda Salicylate. Emetine for injection
Diet should contain no fat. Avoid liquors.

INDEX OF DISEASES AND TREATMENT

Laryngitis

Thymol, Vasaka, and other expectorants Iodine and Iodides Sodium Salts

Leucorrhœa

Alum (both internal and external), Shohaga (Borax), Pot. Permang or Iodine for douching Avoid stimulating drinks Improve general health

Lumbago

Ammon Chlor, Bromides, Datura, Iodine and Iodides, Camphor for liniment, Nux Vomica, Saline Purgatives, Caffeine with its sodium compounds for injection. Salicylates and alkalies In acute state use hot water bottles

Locomotor Ataxia

Arsenic Salts, Potass Iodide, Iodine and Bismuth injection

Mania

Chota Chandra, Camphor and Bromides also salicylates of sodium.

Menorrhagia

Alum, Calcium, Pot. Permang. Astringents to be used as douche for local washing (See Hæmorrhage)

Absolute rest on bed Calcium Chloride may be injected in case of emergency

CHEAP REMEDIES

Mumps

Soda Salicylas and alkalies, Iodine for paint, Aconite for external application. Alum, Saline and Pot Permang Gargles,

Nephritis

Soda Bicarb, Hexamine, Potass Citras etc (See Albuminuria)

Neuralgia

Aconite Paint, Ammon Chloride, Arsenic, Caffeine Aspirin tablets, Cinchona, Menthol, Opium, Bromides, Iodides. If there be any malarial history treat with small doses of cinchona along with other bitters in small doses.

Palpitation

Arjun, Datura, Digitalis, Myrobalan (See Beri-beri).

Paralysis

Bromides, Datura, Iodides, Nux, Purgatives

Piles

Alum, Myrobalan, Opium. Keep bowels free Avoid sun and spices in food. No meats

Pneumonia

Aconite Paint, Arjun, Calci lactas, Camphor for liniment, Digitalis, Garlic, Iodine, Soda Bicarb and all expectorants. Vasaka

INDEX OF DISEASES AND TREATMENT

Phthisis

Alum, Ammon Chlor, Bismuth, Calcium, Creosote, Iodides, Chaulmugra Oil, Oil Eucalyptus, Papaya, Vasaka

Polypus Nasal

Menthol Nasal douche with cold water and lotion
Potass Permanganate

Prolapse Ani

Alum, Copper Sulphate, Nux, Sulphur Find out the cause and treat Treat dysentery by Kurchi, Bael and purgatives

Psoriasis

Chaulmugra, Iodine.

Rheumatism

Aconite Paint, Alum, Ammon Chlor, Arsenic, Chaulmugra, Iodine, Mag Sulph, Menthol, Oil Turpentine, Opium, all alkalies and Sodium salts, Sulphur, Caffeine with Soda Salicylate injection. Purgung by Calomel and Mag Sulph

Sciatica

Ammon Chlor, Bromides, Iodine, Soda Salicylate and alkalies Keep bowels free

Ringworm

Papaya, Sulphur, Potass Permang, Salicylates, Copper Sulphate, Dilute acetic acid

CHEAP REMEDIES

Sores

Borax with honey, Calomel in Syphilis, Iodine, Potass Permang, Sulphur, Soda Bicarb.

Spermatorrhœa

Bala, Bromides, Camphor, Datura, Opium

Sprain

Alum. Saturated solution of Mag. Sulph for external use.

Stomatitis

Alum, Borax with honey, Myrobalan, Pot Permang, Thymol.

Syphilis

Inject Bismuth Salicylate, Iodine, Mercury and its preparations, Opium, Arsenic, Iron Tonics, Iodides, Calomel Avoid alcohol and stimulating foods.

Tooth Diseases

Creosote, Menthol, Myrobalan, Opium, Soda.

Tonsillitis

Aconite paint, Soda Salicylas, Alum for gargling, apply borax with honey, Iodine.

Ulcer

Alum, Bismuth Carbonate, Boric Acid, Creosote, Iodine, Myrobalan, Oil Arachis, Pot. Permang, Soda Bicarb, Sulphur, Thymol

INDEX OF DISEASES AND TREATMENT

Vomiting

Bismuth, Creosote, Iodine, Calomel and Soda Bicarb in fractional doses, Opium, Purgatives, Lemons to suck. Absolute rest and liquid diets

Worms

Castor Oil, Myrobalans, Oil Turpentine, Papaya, Sulphur with lukewarm milk in the morning To be preceded and followed by purgatives Santonin

Leprosy and Leucoderma

Arsenic Sulphide, Babchi, Chaulmugra oil, Iodides.

Therapeutical Classification of Remedies**Alteratives**

(Change from abnormal to normal condition)

Arsenic, Iodine and Iodides Calomel, Soda Bicarb, Cinchona, Nux Vomica. Bitters as Kalmegh

Anæsthetics

Aconite, Camphor, Datura, Menthol

Analgesics or Anodynes

Aconite, Caffeine and Aspirin, Camphor, Datura, Soda Salicylas.

Anhydrotics

Cinchona in Citric acid, Camphor, Datura, Mercury Sulphide (which is equivalent to Makaradhwaja).

CHEAP REMEDIES**Antacids**

(Reduces acidity of gastric contents)

Arachis oil, Soda Bicarbonate

Anthelmintics

(Destroys intestinal worms)

Oil Turpentine, Papaya, Santonin. Thymol
Purgatives before and after.**Antilithics**

(Counteracts Lithiasis)

Soda Bicarb, Alkaline salts

Antiperiodics

(Prevents periodical attacks of certain fevers)

Arsenic, Cinchona and its Alkaloids.

AntisepticsAcid Boric, Bismuth Carbonate, Creosote, Garlic,
Iodine, Menthol, Calomel, Oil Eucalyptus, Oil
Turpentine, Sulphur, Thymol, Vasaka,**Antispasmodics**

(Relaxes spasms)

Bromides, Camphor, Datura. Calomel, Oil
Turpentine, Potass Permang, Vasaka**Astringents**

(Diminishes discharges and bleeding)

Alum, Bismuth, Calcium, Cinchona, Copper
Sulph, Myrobalan, Potass Permang

THERAPEUTICAL CLASSIFICATION OF REMEDIES

Bitters

Bala, Cinchona, Kalmegh, Nux Vomica, Quinine.
 (See also tonics)

Carminatives

Asafœtida, Bael, Camphor, Menthol, Papaya, Soda
 Bicarbonate, Thymol

Cathartics

(See Purgatives)

Cholagogues

(Increases the secretion of bile)
 Calomel, Kalmegh, Soda Salicylas

Counter Irritants

Ammonia, Menthol, Oil Turpentine, Gaultheria oil,
 Babchi.

Demulcents

(Protect and allay irritation of mucous membrane)
 Arachis oil, Isafgul.

Deodorants

(Destroys offensive odour)

Iodine, Oil Eucalyptus, Oil Turpentine, Potass
 Peimang, Thymol.

Diaphoretics

(Increases the amount of perspiration)

Ammon Chlor, Bala, Camphor, Potass Antim Tart

CHEAP REMEDIES**Diuretics**

(Promotes secretion of urine)

Alkalies, Ammon Chlor, Caffeine, Calomel, Isafgul,
Oil Turpentine, Sodium Salts, Punarnava

Ecbolics

(Promotes evacuation of gravid uterus)

Nux, Quinine, Turpentine, Strychnine. All drastic
purgatives. Hot Hip baths. Hot vaginal douches,
Ulat Kambal.

Emetics

(Excites Vomiting)

Alum, Copper Sulphate, Potass Antimony Tartrate.

Emmenagogues

(Restores healthy condition of menstrual discharge)

Papaya, Ulat Kambal.

Expectorants

Ammon Chlor, Asafoetida, Camphor, Oil Turpentine,
Tartar Emetic, Vasaka.

Galactagogues

(Increase the secretion of mammary glands)

Castor leaves.

Hypnotics

(Induces Sleep)

Bromides, Chota Chandra, Nux Vomica, Opium.

THERAPEUTICAL CLASSIFICATION OF REMEDIES

Purgatives

Asafoetida, Bael, Calomel, Castor oil, Mag Sulph, Myrobalan, Paraffin oil (See Cathartics)

Sedatives

(Allays irritability)

Bismuth Carbonate, Camphor, Castor oil, Chota Chandra, Datura, Opium, Pot Bromide

Stomachic

Bala, Bitters, Cinchona, Kalmegh, Nux Vomica, Quinine

Styptics

Alum, Myrobalan, Oil Turpentine, Potass Permanganate.

Tonics

Divided into 4 groups (1) Hæmoglobin, (2) Nervine, (3) Cardiac, (4) Stomachic and intestinal

(1) Arsenic salts and compounds Calcium preparations, Potass Permang

(2) Arsenic, Calcium, Cinchona, Copper Sulphate, Iron, Nux Vomica

(3) Arjun, Arsenic, Digitalis, and Nux Vomica.

(4) Cinchona, Nux Vomica, Papaya Juice, Quinine Sulph (See Bitters)

CHEAP REMEDIES

Aconite Napellus and Ferox

Sans.—*Visha*, Hind—*Bachnag*, *Bikh*, Beng.—*Bish*

Aconite is anodyne, antiphlogistic, antipyretic and diaphoretic Externally it relieves pain of acute and chronic rheumatism, facial and other neuralgias

Aconite is one of the oldest remedies used in India The root is made into a paste and applied over all painful affections It is a great reliever of pain It has internal use also in fevers, rheumatism etc But the drug found in the market may be of any one of the many varieties of aconite, the physiological actions of which differ widely. Without standardisation it would be unsafe to use aconite internally. Therefore internal use of aconite has not been indicated for the use of the village doctor

Aconite can be powdered and kept compressed in small tablets They should be moistened with a little water and made into paste for *lep* by addition of a little honey or syrup. Other counter irritants can be mixed as required.

Alum

Hind & Beng.—*Phitkari*, Tam & Tel—*Patikaram*

Solubility 1 in 11 of water.

Alum is astringent. 10 to 15 grains three times a day have been given for intestinal haemorrhage such

ALUM

as that of typhoid or gastric ulcer or for menorrhagia It arrests excessive secretion in dysentery, diarrhoea and night sweats. Vomiting caused by the cough of phthisis is sometimes checked by 6 to 10 grains doses of alum

Alum is mostly used in aqueous or glycerin solution As a gargle or mouth wash for sores in the mouth 10 grs to an ounce of water is used As a lotion for ophthalmia with formation of pus, for gonorrhœa and leucorrhœa alum 3 grains to the ounce is to be used A saturated solution in water stops bleeding in leech bites etc , 60 grains have been recommended as an emetic in croup In haemorrhage from lungs, stomach, kidney, uterus and other internal organs alum in doses of 10 grains thrice daily is recommended It is inadvisable if much fever is present In bleeding from piles a piece of cloth saturated with alum and a decoction of myrobalans should be kept constantly applied externally In descent of the anus the above application proves useful It has been found useful for enlargement of joints especially that of the knee and for the other swellings resulting from blows, bruises or sprains For this purpose the affected part is to be kept constantly moist with a piece of rag wet with a lotion of 1 drachm to 5 ounces of water In bites of insects alum moistened with water and applied to the place affords in certain cases instant relief

Clearing of water by alum —(1) Put 1 to 3 tablets of alum in a *Kalsi* (pitcher) of water according to the

CHEAP REMEDIES

nature of turbidity. (2) For a well of $4\frac{1}{2}$ ft diameter put 4 ozs of alum after dissolving it in water

Dose :—5 to 10 grs.

Preparation :

Alum—5 grains per tablet.

Ammonia Solution

Prepared by mixing 1 part of solution of ammonia with 2 parts of water.

It is a general stimulant and is used externally (applied to the nostrils) in cases of fainting. It is a powerful rubefacient and in embrocation is used as a counter irritant for pain, stiffness of joints, bronchitis etc.

One part of solution of ammonia mixed with three parts of any bland oil makes an excellent rubefacient to which a little camphor may be added.

It relieves pain when applied to bites of insects

Ammon Chloride**NISHADAL**

White crystals having saline taste

Solubility 1 in 3 of water.

Stimulating expectorant in bronchitis by inhalation or by allowing it to dissolve slowly in the mouth in the form of tablets. In phthisis and chronic bronchitis with tenacious mucus, it facilitates expectoration. It is a hepatic, gastric and intestinal stimulant;

AMMON CHLORIDE · ARACHIS OIL

diaphoretic and diuretic In neuralgia, lumbago and migraine in doses of 20 to 30 grs three times a day it frequently relieves pain after 4 or 5 doses Useful in sciatica, gout and chronic rheumatism ; in acute and chronic congestion of the liver

Very efficacious in malarial congestion of the liver and spleen

Dose — 5 to 60 grains

Preparation

Tablet Ammon Chlor—5 grs per tablet

Arachis Hypogaea

Ground nut ; Pea nut , Monkey nut

ARACHIS OIL

Dr Chopra of the School of Tropical Medicine writes in his book "Indigenous Drugs of India"— "Arachis oil satisfies almost all the properties possessed by olive oil so that it can be used as a substitute for it, particularly in India, where arachis oil is available in large quantities at a very cheap price in contradistinction to olive oil which is very expensive" The properties of olive oil are —

It is a fixed oil expressed from olive kernels It is nutritive, mildly laxative and demulcent in the form of emulsion Externally it is used as a lubricant in massage For gall bladder stones 4 to 8 ozs or even larger doses are given Used as a medium for preparation of liniments, ointments and plasters

CHEMICAL REMEDIES

Olive oil is injected in 15 to 20 c.c. doses when nourishment is otherwise failing. The bland oil reduces the secretion of acid and is therefore given in gastric ulcer. It protects the ulcer and also acts as a food.

Olive oil penetrates through the skin when rubbed and is therefore specially useful as a basis for administration of metallic oxides and alkaloids.

Arjun

SYNONYMY ARJUNA

Hind & Beng.—*Arjun*, Tam—*Vellaimarudamaram*, Tel—*Tella Maddichettu*.

ARJUN BARK

Arjun is being used from the ancient times in heart diseases and inflammations and dropsy arising therefrom.

It is very quick in its action. In heart diseases, in palpitations or in feeble pulse a few tablets kept on the tongue will gradually let its active principle be absorbed. The effect on the pulse is immediate and also lasting.

Recent researches prove the drug to be a cardiac stimulant and tonic increasing the force of contraction and prolonging the diastole. It slows the heart without making it irregular and never acts as a cardiac poison. It is invaluable in heart diseases where a combined tonic and stimulant action is required.

ARJUN ARSENIC

Its good effect in local inflammation is due to blood pressure. Experiments show it to cause the contraction of the peripheral arterioles and increase the passage of the blood corpuscles through vessel walls. For this reason it acts with wonderful efficacy in local inflammation of the heart. As a diuretic it is also very effective.

Dose —20 grains

Preparation

Tablet Arjun—4 grs per tablet, 5 tablets per dose

Arsenic

ARSENIOUS ACID

A heavy white, odourless and tasteless powder

Solubility 1 65 water.

A general tonic and alterative, valuable in chronic eczema, in gout and in chronic rheumatism, in painful dyspepsia, in neuralgia and spasmodic asthma specially of anaemic and malarial origin, in the intervals of attack of pain in the heart. It is given in pernicious anaemia and allied blood diseases with good results. Indispensable in all forms of weak heart accompanied by pain. Antiperiodic in malaria. Stimulant to nervous system. The drug is of the greatest value in anaemic vomiting.

Dose —1/60 to 1/12 grain

Preparation

Tablet Arsenic—1/20 grain

CHEAP REMEDIES

Antidotes to arsenic poisoning —Stomach tube, emetics, mucilaginous drinks, arachis oil, stimulants, warmths, large quantities of magnesium oxide, fresh moist ferri-hydrate prepared by the interaction of magnesia and ferrous sulphate.

It is criminally used. Being a white tasteless powder it eludes detection. Symptoms like that of cholera appear and then bloody stools.

Asafœtida

Hind & Beng.—*Hing*, Tam—*Kayam*, Tel.—*Inguna*

An oleo-gum resin obtained from the root of Ferula Fœtida.

Nervine stimulant, expectorant, laxative and carminative. Useful in cases of flatulence in cholera, in hysterical paroxysms, also in some cases of chronic bronchitis. Very useful as an enema in the flatulent distension of typhoid and in infantile convulsions. It is successfully used for prevention of abortion. It is extensively used in hysteria and nervous disorders of women and children.

Dose :—For diarrhoea and cholera—1 to 2 grs.

„ nervous flatulence etc —5 to 15 grs.

„ enema in flatulent colic—30 grs. in 6 ozs. of water.

Preparation :

Tablet Asafœtida—2 grains.

BABCHI—HARITAL

Babchi

Psoralea Corylifolia

Sans—*Vakuchi*, Hind—*Babchi*, Beng—*Bavachi*,
Buchki, *Lata Kasturi*, Bomb—*Bawachi*, Tam—
Karpokarishi, Tel—*Karubogi*

Babchi Seeds

Brownish black seed of the herbaceous weed which grows throughout India. The seeds have been used for leprosy internally and as an ointment externally. The drug is considered to be very efficacious in leprosy and is named *Kustha Nashini*. In inflammatory diseases of the skin in leucoderma and psoriasis it is given both locally and by mouth. The seeds are used as anthelmintic, diuretic and diaphoretic in febrile condition. It has been very largely used for patches of leucoderma. Indeed it is held that leucoderma patch cannot resist this treatment. For leucoderma a favourable prescription is—

Babchi Seeds	1 dram
Harital Red	1 dram
(Arsenic Sulphide)	

made into fine powder and then rubbed into a paste with cow's urine. The paste is applied on the patch, in a few days colour begins to change and spots with normal colour begin to appear and soon the entire patch is healed.

Recent researches confirm the efficacy of babchi in leucoderma. The effect of the seeds is due to the

CHUPA BEMPIES

presence of an oil which has powerful action against skin streptococci. The skin becomes red on the application of the oil and is stimulated leading to pigment formation.

Preparation :

Tablet Babchi-Harital—5 grains each

To be made into paste with water or cow's urine for application on leucoderma patches.

Babchi oil is now available and may be used in place of the seeds for making the pigment for leucoderma.

Bael

Sans—*Sriphal, Bilva, Hind, Beng & Bomb - Bael*
 Tam—*Vilva Pazham, Tel - Bilva Pandu, Cana - Bilapatri, Guz - Dilmuphal*

The fruit of *Egle Marmelos*. The half ripe fruit is best suited for medical use. It is of immense value in cases of obstinate diarrhoea and dysenter when unattended by fever and the patient is weak and dyspeptic. Unripe or half ripe bael is astringent, digestive and tonic while ripe bael is laxative, aromatic and cooling.

In irregularity of bowels presenting alternating diarrhoea and constipation bael is particularly useful. It is a mild stimulant to the intestinal peristole and therefore while it tends to relieve diarrhoea it may be certainly active and laxative.

BAEL . BALA

when constipation exists. It is invaluable for all stages of diarrhoea and dysentery

From recent researches it appears to have little or no effect on acute dysentery when there is discharge of blood. The beneficial effect of bael is most evident when the condition has become subacute or chronic. In chronic stage blood gradually disappears and the stools assume a more solid form. From the same researches it appears that apart from its action in chronic dysentery it has no action on either amoebic or bacillary dysentery. Its utility in combination with kurchi or emetine hydrochloride cannot be denied.

Dose —30 grains

Preparation

Tablet Bael—5 grs each
6 tablets per dose

Bala

SIDA CORDIFOLIA

PLANT

Sans & Beng —*Bala*, Hind —*Khareti, Baria*

It was known to Sanskrit writers and was prized by them as also Mohammedan physicians. The author of the Bengal Dispensatory found it to promote perspiration, to increase the appetite and to act as an useful bitter tonic. In Goa, the Portuguese value it as a diuretic specially in rheumatic affections. Hindu physicians prescribe it in nervous diseases.

CHEAP REMEDIES

Recent researches have proved that the alkaloid of bala is ephedrine. Its use as a cardiac stimulant in Hindu Medicine was thus fully justified. The whole plant contains .085 per cent and the seeds 0.3 per cent of ephedrine. Therefore bala plant powdered may be used in all cases where ephedrine or adrenaline is indicated. Ephedrine of commerce is made from Chinese and Indian variety of Ephedra. (See Ephedrine).

Dose :— 5 to 10 grs.

Preparation :

Tablet Bala—5 grs. each
1 to 2 tablets per dose

Bismuth Carbonate

Bismuth Carbonate is sedative and astringent both internally and externally. It is highly useful in gastric pains with eructations, all forms of vomiting and irritative dyspepsia, in gastric ulcer also in diarrhoea from any cause. It is usually combined with mag carb and opium etc. Bismuth salts blacken the faeces. In diarrhoea of phthisis, bismuth is effective. Bismuth forms a protective coating on ulcerated surfaces and mucous membrane of the stomach and intestines.

For its astringent character it is used as a dusting powder. The wound surface is kept dry and a protective coating is formed which favours healing.

BISMUTH CARBONATE AND SALICYLATE

Dose — 10 to 30 grains.

Preparation

- (I) Tablet Bismuth Carbonate—5 grains
 (2) Tablet Bismuth cum Opium as under —

Bismuth Carbonate 5 grs.

Opium $\frac{1}{2}$ gr.

The last tablets are particularly useful in diarrhoea.

Bismuth Salicylate

Bismuth and its salts are now used for the intramuscular injection in oily suspension in syphilis. It is given alternately with arsenic or iodides. Bismuth is less active than arsenic but is more active than mercury and it is believed to be more active than even arsenic in tertiary stage. It has been found to penetrate into the cerebro-spinal fluid and is specially useful in syphilitic nervous diseases. In those cases where mercury and arsenic have failed, bismuth should be resorted to.

For intramuscular injection bismuth is prepared as under.—

Bismuth Salicylate	.	25 gms
Camphor	..	1 gr.
Creosote	.	1 mm.
Olive Oil	...	2 cc

The ingredients are rubbed into an impalpable paste and filled in 2 c.c. ampoules

CHEAP REMEDIES

Bismuth in this form is regarded to be at least 4 times more efficient but less toxic than mercury. The aim in bismuth therapy is to introduce the largest possible quantity without intoxication, and to maintain a strong saturation over a long period. Salicylate is absorbed quickly and is painless.

Dose and method of administration :—One injection daily for one week. After an interval of two weeks again another course, then interval of a month and third course. Iodide and mercury by mouth should accompany bismuth injection. Iodine injection alternated with bismuth injection in syphilis has given exceedingly satisfactory results.

Bismuth Creo-Camphor Olive Oil Ampoules—2 cc

Borax**SOHAGA**

Borax, Borate of Sodium.

Hind & Beng.—Sohaga, Tel.—Elegaram.

Tam—Venkaram, Cana—Biligara

It is antiseptic and parasiticide. Local sedative to inflamed mucous membrane. A solution is used in leucorrhœa and gonorrhœa for internal wash. As a gaigle lotion use 1.20 of water. For allaying the distressing irritation of the genital organs the lotion may be used by soaking a piece of rag with it and keeping it over the part. In case of women it should be injected. It allays the irritation of rash, sore nipple, prickly heat and other skin diseases. It is used for

BORAX BORIC ACID CAFFEINE

granulating and suppurating surfaces in general and is therefore used as an ointment with any suitable medium. As a lotion it is used as an eye drop in 4 grains per ounce solution. One of borax rubbed with 8 of honey will make an excellent paste for mouth sores or white spots. A better way is to dehydrate the borax by heating it in a pan over fire when borax swells and becomes white. This is powdered and rubbed with honey. Boric Acid may be used in place of borax.

Preparation

(1) Dehydrated Borax	...	1
Honey or Glycerin	.	8

Rub and make it into an uniform paint for white spots and sores in the mouth.

(2) Boric Ointment

Boric Acid	.	10 grains
Paraffin soft		1 ounce

Caffeine

Caffeine is an alkaloid obtained from tea leaves which contains 2% to 4% of it. It is soluble in cold water 1:80 and 1:1 of boiling water. It is generally made from tea waste.

It is a valuable heart tonic and diuretic. It is valuable in spasmodic asthma. It is a very powerful drug and is frequently used for its action as a cardiac stimulant either for a weak heart or in acute febrile

CHEAP REMEDIES

conditions when the circulation is likely to be embarrassed.

Its diuretic action usually combined with digitalis is often used in many dropsical conditions specially with heart disease. It is of some value in the oedema following chronic kidney diseases but on account of the renal congestion it causes, it is unsuitable in the acute affections of the kidneys

It has become very popular for headache and other neuralgic pains in combination with aspirin

Dose —2 to 5 grains

Caffeine being very little soluble in cold water cannot be used in injections as it is. But fortunately it is soluble in a solution of certain salts such as sodium benzoate. Therefore Caff-Sodii-Benzoas is used where caffeine alone is intended to be used as a heart tonic.

Preparation :

- (1) Caffeine Soda Benzoas Ampoules
Heart stimulant and diuretic.

Caffeine	...	...	2½ grs
Sodii Benzoas	...	...	2½ grs.
Distilled water	...	2 c c	
Ampoule Caffeine Soda Benzoas			

Dose —1 to 2 c c

- (2) Caffeine Soda Salicylate Ampoules
Anti-rheumatic and heart tonic

CAFFEINE CALCIUM

Caffeine pure	3 grs
Soda Salicylate ...	3 grs
Distilled water	2 c c

Ampoule Caffeine Soda Salicylate

Dose —1 to 2 c c

(3) Caffeine Aspirin Tablets
Headache and pain cure

Caffeine	... 1½ grs
Aspirin	... 3 grs

Tablet Caffeine Aspirin

Dose —1 or 2 tablets at a time

Calcium

Calcium Lactate

It increases the coagulability of blood and is therefore used in the gastric, intestinal and pulmonary haemorrhages. It has been found by some to be very useful in the treatment of pneumonia. When used for stopping internal bleeding it should not be given for more than three or four days at a time. Otherwise the blood will become less coagulable.

Dose —15 to 60 grains.

Preparation

- (1) Tablets Calcium Lactate 5 grs
- (2) Ampoules—Calcium Chloride 5% sol
- ,, Calcium Chloride 10% sol

Put up in 1 c c and 2 c c ampoules

CHEAP REMEDIES

Castor

Oleum Ricini, Castor Oil.

Hind.—*Aandi-ka-tel*, Beng.—*Bherenda tel, Redu tel*, Tam—*Amanakkam-chedi*, Tel.—*A 'mudam*, Guz—*Yai andi-nu-tel*.

It is a mild and speedy cathartic. It is the best purgative in constipation from indurated faeces or after swallowing acrid substances. Used in diseases with irritation and inflammation of the bowels as colic and diarrhoea due to indigestible foods, dysentery and constipation from typhoid fever. The most suitable purgative during pregnancy. The safest cathartic for infants. It may be administered in enema with some mucilage or oily fluid. Often successful in tape worms.

Dropped into the eye it soothes the irritation caused by a foreign body but paraffin oil is more preferable. The decoction of the leaves or oil applied to the breasts is said to produce abundant secretion of milk.

Dose :—1 to 8 drams.

For repeated doses the oil may be made into an emulsion with mucilage acacia as under :—

Castor oil	...	...	1
Mucilage Acacia	...	...	1
Water to	...	...	$4\frac{1}{2}$

The above emulsion is very suitable in the earlier stages of dysentery.

CAMPHOR

Camphor

Beng — *Karpur*, Hind — *Kapuri*, *Kafur*

Sol. 1 700 of water, 1 1 of alcohol, 1 4 of olive oil, 1 2 of turpentine oil, Camphor forms a liquid when mixed and rubbed with carbolic acid, thymol, menthol, naphthol and salicylic acid

It is a sedative, antispasmodic, carminative, expectorant, diaphoretic, stimulant, a local anaesthetic and a feeble antiseptic

Stimulant in the prostration of febrile diseases, sedative in mania, delirium etc Useful in dysmenorrhœa, spasmodic asthma and chronic bronchitis and cholera Useful also in hysteria and spermatorrhœa Its application as a paint in the nostrils is highly useful and relieves irritation of the nostrils in common colds and influenza with coryza In large doses camphor causes depression It is slightly analgesic and is therefore used in liniments To a weak or diseased heart it sometimes gives strength and tends to make irregular rhythm regular Therefore it is often given in pneumonia subcutaneously dissolved in olive oil (1 gr in 1 c.c.)

Some say that injection in 10% oily solution every 15 minutes is invaluable in cases of cardiac asthma, while others agree that hypodermic injection of camphor in oil in doses up to 50 grs is not of any clinical value as a heart stimulant

Dose — 2 to 5 grs.

CHEAP REMEDIES

Preparation :

- (1) Tablets Camphor— $1\frac{1}{2}$ grains each tablet
- (2) Ampoule Camphor in oil—1 gr in 1 c.c

Chaulmugra**CHAULMUGRA OIL**

The fatty oil expressed from the seeds of *Hydnocarpus Wightiana*

It is recommended in psoriasis, obstinate eczema and other skin diseases, in chronic rheumatism, gout and in phthisis. The oil may be used alone as an ointment for various skin diseases for external use. It can be given internally also.

It is possible that it alone or in combination with other remedies acts more efficiently when injected hypodermically than when given by mouth. It is the most valuable remedy for leprosy. For all advanced nodular cases of leprosy injected intramuscularly in doses of 2 to 5 c.c it is still the best palliative. The injections should be repeated every three days and the course should last at least five months or more if the patient can stand, for at times it may become very painful. Intradermal injection is found to be more efficacious in leprosy than intramuscular injections.

Preparation :

Ampoule Chaulmugra Oil—2 to 4 c.c

CHOTA CHANDRA . CINCHONA FEBRIFUGE

Chota Chandra

Rauwolfia Serpentina

Sans.—*Sarpagandha*, *Chandika*, Hind—*Chota Chand*, Beng & Bomb—*Chandia*, Behar & Orissa—*Dhan maria* or *Dhan barua*, Tam—*Covannamulpozi*, Tel.—*Patala-gandhi*

The Root

It was known to the Indians as an antidote to bites of poisonous reptiles. But recently the drug has attained prominence as a remedy for insomnia. The hypnotic action of the drug was known to the poorer people of Behar. In U P and Behar the drug is sold as *Pagal-hi-Dawa*.

The drug is used in cases of mild and violent insanity and in cases of high blood pressure. In doses of 20 to 30 grains of the root twice or thrice daily produces sleep and reduces blood pressure. The drug promises to be a very useful one.

Dose —30 to 180 grains once daily for insanity

Preparation :

Tablet Chota Chandia—6 grs each tablet 5 to 30 tablets per dose according to its use as sedative for insanity

Cinchona Febrifuge

It contains all the residual alkaloids of cinchona bark and its properties are similar to that of quinine. In chronic malarial cachexia and obstinate cases of

CHEAP REMEDIES

kala-azar where quinine does no good work it acts marvellously. It was formerly believed that only quinine was useful in malaria and the other alkaloids were no good. But recent researches have shown that the residual alkaloids of cinchona bark left after quinine is extracted are as efficacious as quinine itself. By substituting the residual alkaloids or what is called in the trade Cinchona Febrifuge for quinine, enormous saving of cost in the treatment of malaria may be effected

It is tonic, bitter, stomachic and astringent. It is valuable in neuralgia and in convalescence from acute diseases. It is useful in diarrhoea, excessive perspiration, chronic discharges from mucous membranes. In small doses it acts as a most valuable tonic and bitter stomachic. It is contra-indicated in advanced stage of pregnancy. It is the best remedy in influenza and in pneumonia, 2 or 3 grs every 2 or 3 hours very closely approaches a specific. In malaria it should be given 3 or 4 hours before the attack of fever is anticipated.

Dose :—3 to 10 grains

Preparation :

- (1) Tablet Cinchona Acid Citric—5 grs. The cinchona tablets are made up with citric acid for ready assimilation of the cinchona
- (2) Influenza Tablets:—Cinchona Febrifuge $1\frac{1}{2}$ grs, Ammon Chlor 2 grs, Soda Benzoate

CINCHONA FEBRIFUGE COPPER SULPHATE

2 grs., Thymol $\frac{1}{2}$ gr 1 to 2 tablets at a time.
two to three times daily

- (3) Ampoule Cinchona Alkaloids—5 grains in
1 c.c. (Sol in Citric Acid)

Cinchona in intramuscular injection is painful and occasionally the swelling will remain long as a hard lump To avoid pain and painful after-effects, the injection should be given on the buttocks The site should be rendered warm by applying a hot water bag for sometime before the injection After injection the locality should be massaged and kept hot by application of hot water bag or hot fomentation for a long time. Alternate massage and fomentation should continue for at least half an hour

- (4) Tablets Cinchona-Iron-Arsenic-Nux Vomica
(Convalescence Tablets)

Cinchona Febrifuge $1\frac{1}{2}$ grs., Ferric Cacodylate $\frac{3}{4}$ gr., Nux Vomica seed powder $1\frac{1}{2}$ grs Made into tablets

One tablet 2 to 3 times daily after food

Copper Sulphate

Beng & Hind —*Tutia*

Solubility 1 in $3\frac{1}{2}$ water

Astringent, prompt emetic It is recommended in chronic diarrhoea specially that of phthisis Externally it is used for stopping bleeding from surfaces and as a weak stimulant to indolent and granulating ulcers It

CHEAP REMEDIES

removes sloughs from wounds Its solution is used for douching to prevent excessive secretion from mucous membranes specially in leucorrhœa and gonorrhœa It is the most efficient remedy for granular lids

Dose :—As an astringent $\frac{1}{2}$ to 2 grains In lotions 4 grains per ounce of water. As an emetic 5 to 10 grains

Creosote

Creosote is an oily liquid obtained by the distillation of beech wood tar. It contains a mixture of guaiacol and creosol It resembles carbolic acid in action but is less poisonous. It is given internally in gastric fermentation and in putrefactive diarrhoea and with considerable success in phthisis It is used for arresting nausea and vomiting of pregnancy and phthisis.

Lotion .

Creosote	... 8 mm
Water ...	1 oz.

Ointment .

Creosote	... 1 part
Paraffin Soft	... 9 parts.

Lotion and ointment are used for eruption of a scaly character for venereal ulcers and in parasitic skin diseases. Creosote is used as an inhalation in foetid bronchitis, phthisis and pulmonary gangrene It is the most useful drug in pharmacopœia as far as

CREOSOTE DATURA

the cure of phthisis is concerned Internally it is best given as an emulsion in acacia mucilage A novel form would be to make tablets with kaolin basis

Creosote	1 mm
Kaolin	5 gis

Make tablets , containing 1 mmum of creosote per dose These tablets are safely taken internally In toothache a tablet or two may be placed in the cavity of the tooth and plugged with cotton wadding Owing to the difficulty of administering creosote, guaiacol and thiocol which are both products of beech tar creosote are in favour with medical men But if administered in tablet form the less costly article, creosote will do in place of these preparations

Datura

Datura Leave

It is identical in its action with belladonna which has the following medicinal properties —

Anodyne, antispasmodic and urinary sedative It checks secretions of milk, sweat and saliva It is given for epilepsy and is one of the best remedies for whooping cough and painful spasms of the bladder, in renal colic, dysmenorrhœa and for asthma It is of the utmost value in relieving cardiac pain and distress, palpitation and aortic regurgitation Useful in typhoid with contracted pupil, in acute bronchitis stops profuse secretion In large doses it causes dilatation of the

CHEAP REMEDIES

pupils and dryness of the mouth and throat Good for habitual constipation, nocturnal incontinence of urine Useful in loss of tone and irritable state of generative organs which give rise to nocturnal emissions Should be tried in all cases where bromides have failed.

From datura the alkaloids hyoscyamine and atropine may be obtained. Datura is very abundant and yet alkaloids that can be easily made from it, continue to be imported. Datura is being cultivated in America for medicinal purposes

Dose . - 3 grains

Tablets Datura—3 grains each.

Several tablets are to be used for pigment or *lep* or for smoking.

Atropine Sulphate

Atropine is an alkaloid obtained from Atropa Belladonna and Hyoscyamus Muticus and other plants of the same family. The active principles of datura is of the same nature as atropine. Atropine stimulates the respiratory and vaso-motor centres and therefore the breathing becomes quicker and deeper and the blood pressure rises. Atropine is given hypodermically in opium poisoning to stimulate the respiratory centre. With large and poisoning doses the reverse action takes place

Dose :—1/240 to 1/60 grain.

Preparation :

Ampoule Atropine Sulphate—gr. 1/100 in 1 c.c.

DIGITALIS EPHEDRINE HYDROCHLOR

Digitalis

DIGITALIS LEAVES

It is cardiac and circulatory stimulant and tonic. It increases the strength and efficiency of cardiac contractions and reduces the pulse rate without diminishing its tension. Of great value as heart stimulant in pneumonia. Diuretic, useful in cardiac dropsy, also in renal dropsy when acute or due to failure of a hypertrophied heart, the best diuretic in deficiency of urine due to circulatory disturbances.

It is cumulative in action and requires watchfulness. Its continued use deranges alimentary system. After a course of ten days it should be discontinued for three or four days. Dangerous in advanced fatty degeneration of the heart. It is antipyretic in bigger doses.

As digitalis in tincture form deteriorates quickly in keeping, leaves in tablet form should be accepted as the most suitable form for the administration of the drug. Digitalis of proper quality is now obtainable in India in commercial quantities. Dr Chopra and his co-workers some years ago investigated the properties of digitalis grown in India and found that Indian grown digitalis could be substituted for imported varieties with advantages.

Ephedrine Hydrochlor

This is the hydrochloride of an alkaloid obtained from certain species of Ephedra. The Indian variety

CHEAP REMEDIES

of Ephedra Vulgaris from Kashmere is used by the B. C. P. W. Ltd. for extracting the alkaloid This alkaloid ephedrene closely resembles adrenaline. It is a broncho-dilator and raises the blood pressure. The effect though less than that of adrenaline is more lasting. It may be given by mouth. In order to get the best results it should be administered when the stomach is empty. It has been found to be very useful in $\frac{1}{2}$ gr. doses in asthma.

Dose :— $\frac{1}{2}$ gr. tablets

Preparation .

Tablet Ephedrine Hydrochlor— $\frac{1}{2}$ grain each
Ampoule Ephedrine Hydrochlor gr $\frac{1}{2}$ in 1 c.c.

Eucalyptus

Volatile Oil

It is an oil obtained from distillation of the leaves of Eucalyptus

It is a powerful antiseptic, deodoriser and antipyretic It is used as inhalation in pulmonary gangrene, phthisis, influenza and coryza and catarrh in the nose It is used internally and also by inhalation to relieve the cough in chronic bronchitis, phthisis and asthma It is mostly used as an antiseptic and deodorant

Dose :— $\frac{1}{2}$ to 3 minims.

May be administered in mucilage.

GARLIC

Garlic

Allium Sativum

Sans—*Lasuna*, Hind—*Lasan*, Beng—*Rashun*.
 Tam—*Vallar pundu*, Tel—*Vellulli tella-gadda*

As a medicine garlic was held in high repute by the ancients. It is held to be hot and stimulant and useful in coughs, fevers and other debilitating conditions. The juice is a rubefacient and is dropped into the ear for earache and deafness.

Modern therapeutic practice has given a good place to garlic as an antiseptic. Used as a lotion for washing infected wounds and foul ulcers garlic juice in four times its weight of water was found to give very satisfactory result. There was definite improvement in 24 hours and more marked improvement in 48 hours. It allays pain of wounds.

For internal administration it is found to be useful in atonic dyspepsia, flatulence and colic. It is very effective in bronchial and asthmatic complaints. It is a prophylactic for typhus, typhoid and diphtheria. If one dram garlic juice be given every 4 or 6 hours in early cases of typhoid then the attack is warded off. In diphtheria the constant application of the juice reduces temperature and relieves the patient. Even after the disappearance of the membrane 1 or 2 oz of bulb should be continued to be given daily for a week. It relieves whooping cough. Garlic has been found to be a very powerful agent in reducing blood pressure. It is being more and more largely used for this purpose.

CHEAP REMEDIES

Crossman (1918) thinks that garlic, if given in sufficient doses, is an invaluable remedy for the treatment of pneumonia. In pulmonary phthisis garlic and its preparations have been used very extensively. Appetite is improved, obstinate cough is relieved and night sweats stop.

Dose :—30 grains. Three times daily

Preparation .

Tablet Garlic—8 grs. each tablet.
4 tablets per dose.

Ipecac Emetine Hydrochlor

The dried roots of ipecacuanha are used which should contain at least 2% of the alkaloid (emetine)

It is of signal value in amœbic dysentery, in inflammation of the liver and abscess. But in treatment of these it has been replaced by emetine hydrochlor, one of its alkaloids.

Emetine Hydrochlor

This substance is soluble in water. Ampoules are made containing $\frac{1}{2}$ gr. to 1 gr. in 1 c.c of water. In cases of amœbic dysentery injection of emetine hydrochlor acts as a charm. It has a depressant action on the heart and should be administered with caution in cases of weak heart. Where a long course of injection is required such as liver abscess, not more than six injections should be given at a time. With

EMETINE IODINE . POT IODIDE

intervals several courses may be given with safety. Instead of relying on emetine alone kurchi is to be given also by mouth

Preparation

Ampoule Emetine Hydrochlor— $\frac{1}{2}$ to 1 gr in 1 c.c.

Iodine

Iodine is obtained from the ashes of sea weed. It volatilises considerably at ordinary temperature

Iodine is antiseptic, alterative, deodoriser and disinfectant Locally it is irritant or vesicant according to the strength employed Internally it is largely used in the form of iodides In the form of potassium iodide (10 to 30 grs, 3 times a day) it is specific in tertiary stages of syphilis In 30 grains doses three times a day it is very useful in aneurism Externally the tincture is applied in parasitic skin diseases The tincture is employed as a gargle for ulceration of throat in 1 32 of water One or two drops of tincture in $\frac{1}{2}$ ounce of water every 30 minutes is often successful in checking vomiting including that of sea sickness and pregnancy

Solution of Iodine mixed with creosote and thymol may be continually inhaled for relieving the troublesome cough of phthisis

If employed in the beginning of typhoid it acts almost like a specific, shortening the duration (2 or 3 drops of tincture per oz of water, 2 or 3 times a day) Injection of 1 or 2 drops of tinct iodine in 1 c.c. of

CHEAP REMEDIES

water on the border of the erysipelas does good. It may be repeated the next day. Hiccough may be cured with a few doses of iodine. Enlargements of the thyroid glands subside with small doses of tincture iodine.

Preparation . .

Iodine : Tincture Strong.

Iodine 10, Potass Iodide 6, Distilled water 10.
Alcohol to 100

Iodine . Tincture Weak.

Iodine 1, Potass Iodide 1, Distilled water 1.
Alcohol to 40 The tincture for external application
may be made by substituting methylated spirit for
alcohol.

Potassium Iodide

Useful in secondary and tertiary syphilis and in all diseases associated with it as for example, locomotor ataxia. For secondary symptoms 60 gms. may be given in 24 hours. It reduces chronic inflammatory swellings, effusions, glandular inflammations and is useful in goitre and obesity. Useful also in chronic Bright's disease, bronchitis, bronchial asthma, pain in the heart, in chronic rheumatism and gout, in lumbago, sciatica, psoriasis and all cases where iodine is indicated. It should be given in phthisis with caution.

Dose :—5 to 30 grains.

Tablet Potass Iodide—5 grains each.

IODINE ISAFGUL

Hypodermic iodine is indicated in many cases where iodine and potass iodide are indicated for oral administration. It has been largely advocated in cellulitis, erysipelas, syphilis and other infections and in all glandular swellings. It is said to be serviceable in plague, pneumonia and certain other septic processes.

Preparation

Ampoules Iodine (of the strength of
Tinct Iodine) 1 c c

Isafgul

Plantago Ovata

Isafgul Seeds

It is being used from a long time in Indian medicine in dysentery, diarrhoea, and other inflammatory and functional derangements of digestive organs. In affections of the kidney, bladder and urethra and in gonorrhoea it is used for its diuretic and soothing properties. The seeds yield copious mucilage.

The seeds are encased in a mucilage containing cover. These covers can be separated and used as drug or the whole seed with the cover on can be used. Dr Chopra prefers the whole seeds to the separated husks.

Experiments have shown that the mucilage does not foster the growth of bacteria and that it forms a sort of coating between the faeces and the gut. The action of the drug is purely mechanical. The mucilage is not acted on by the digestive enzymes and passes out

CHEAP REMEDIES

Kurchi has created acute interest in the pharmacologists and has been subjected to tests in every form and manner. Kurchi contains 1 2% total alkaloids These alkaloids are as powerful as emetine in their immediate effect on the symptoms as well as in the curative value. They do not produce any of the toxic effects produced by emetine. Intramuscular injection of total alkaloids although effective in acute cases did not give satisfactory results in chronic cases. But bark extracts taken by mouth did give excellent results. This drug marks a definite advance in the treatment of amœbic infections.

Dose :—20 to 30 grains

Preparation :

Tablet Kurchi Bark—5 grs. 4 tablets per dose.

Magnesium Sulphate

EPSOM SALT

It has a bitter saline taste It is a powerful saline purgative operating with little pain or nausea. If given by mouth in concentrated form it abstracts fluid from all parts of the alimentary canal and forms copious watery stools It is useful therefore in cases of œdema and dropsy. By reducing blood pressure it wards off apoplectic attacks Along with ferrous sulphate it is given in anaemia It is specific in bacillary dysentery in 1 dram doses every 2 hours. The benefits of intramuscular injection in acute rheumatic fever are little short of marvellous Deep

MAGNESIUM SULPHATE , MENTHOL

Subcutaneous injection of 25% solution 4 c c daily of considerable value in acute rheumatism. Not more than four injections are required as the pain rapidly disappears but the salicylate is needed for complete cure.

External application of a saturated solution has marked effect in lessening the pain of erysipelas and cellulitis. Absorbent cotton soaked in it is put to cover the affected area and beyond. The pad should be bandaged with oil silk and wetted every two hours. Should be removed once in 12 hours for inspection and reapplied. The affected area should not be washed during the treatment.

Injection of less dilute solution viz, 8 c c of 2½% solution is very useful in tetanus. The injections are painful.

Dose — $\frac{1}{2}$ to $1\frac{1}{2}$ dr for repeated administration or single dose— $\frac{1}{4}$ to $\frac{1}{2}$ an ounce.

Preparation

Tablets Mag Sulph—30 grains each

Ampoules Mag Sulph 25% sol 4 c c

,, Mag Sulph 12½% sol 2 c c

Menthol

It possesses strong characteristic odour and taste of peppermint. It is antiseptic, stimulant, carminative and local anaesthetic. Applied externally it relieves the pain of headache, neuralgia, rheumatism and toothache. Application of menthol in oil

CHEAP REMEDIES

solution to nose wards off attack of colds. But it is not safe for children. There is danger of poisoning and death is reported to have followed the application of menthol ointment to an infant. A mixture of 3 of menthol and 2 of camphor forms a liquid at ordinary temperature. It is usually applied externally.

Solubility—1 : 4 of olive oil.

Calomel**Mercurous Chloride****HYDRARG SUBCHLOR**

A heavy, odourless and tasteless powder.

Alterative, indirect cholagogue purgative, antiseptic and diuretic. As an alterative it is used in syphilitic affections, chronic skin diseases and glandular enlargements. Useful in chronic hepatitis, catarrhal jaundice and in chronic pharyngitis. Repeated small doses are of great benefit in obstinate vomiting, also in gastro-intestinal catarrh and diarrhoea of children. It is used as a purgative in biliousness, hepatic and cardiac dropsy, apoplexy, gout and in congested and torpid liver due to free living. In hiccough calomel $\frac{1}{4}$ grain doses every hour is often successful.

In enteric fever the stupor, tremor, headache and coma, all of which may be due to intestinal sepsis and ptomaines are removed and the entire aspect of the case changed by 1 to 3 grains of calomel. Calomel in $\frac{1}{4}$ grain doses with soda bicarb repeated every

CALOMEL . MAKARADHWAJA

15 minutes is almost a specific for cholera. In earlier stages of cholera and in diarrhoea, repeated fractional doses act marvellously

Its local uses are numerous As a gargle in syphilitic sore throat In a wide range of skin affections, specially syphilitic, it is invaluable as an ointment Along with the usual antispasmodics it is of great benefit in asthma

Dose — $\frac{1}{2}$ to 3 grains ,

Preparation .

Tablets calomel 1 grain also $\frac{1}{4}$ grain each

Ointment, Calomel

1 dram mixed with 1 ounce of soft paraffin or lanolin

Mercuric Sulphide Red

It is the chemical equivalent of makaradhwaja and is to be used in all cases where makaradhwaja is indicated It is particularly recommended in chronic wasting diseases

Dose — 1 to 3 grains

Tablet Makaradhwaja (Mercury Sulphide Red)
2 grains

Makaradhwaja was at one time believed to be of no therapeutical use although the kavirajas swear by it. But recent researches (Ghosh 1931) have

CHEAP REMEDIES

gone a great way to clear the mystery round this insoluble mercury compound so highly extolled by ancient and modern kavirajas. Ghosh has found that if mercury sulphide is digested with filtered gastric juice obtained artificially from a healthy patient, it dissolves. By feeding a young dog with finely powdered makaradhwaja once a day for three consecutive days he has shown the presence of mercury in the liver. He concludes that the insoluble sulphides are changed into soluble chlorides by the action of the gastric juice and in this form mercury is absorbed into the system and stored up in the liver and the other organs. But this being a single experiment some find difficulty in accepting the results. But whatever be the results of further research, this much is certain that makaradhwaja lives and will continue to attract attention.

Recent researches have shown that mercury ion in a high state of dilution has a definite stimulant action on animal tissues. One in one million of mercuric chloride distinctly stimulated mammalian heart. Makaradhwaja must be acting in fine division similarly in stimulating the heart. These researchists confirm that administration of makaradhwaja produced distinct clinical and beneficial results in several cases under observations.

It is used as a laxative with good result and as an intestinal antiseptic it is said to be of great utility reducing the bacterial contents of the intestinal walls.

MYROBALAN . NUX VOMICA

Myrobalan

Hind—*Har*, *Ha'ra*, Beng—*Haritaki*, Tam—*Kadukkay*, Tel—*Karakkaya*, Guz—*Harle*

Myrobalan is a safe and effective aperient. It has been extolled as an effective cure for dyspepsia, pain in the bowels, flatulence, palpitation, headache etc and myrobalan has been maintaining its reputation. Sores in the mouth and the tongue which continue for months have been cured by regularly taking one myrobalan every night. 4 to 6 fruits make a full dose for having a good purgative action. It expels round worms also. Constipation, biliousness and dyspepsia can be cured by it even in weak patients.

It is wonderfully efficient as an astringent. It can be successfully used for applications as a paste in water or oil for chronic ulcerations, ulcerated wounds and skin diseases attended with profuse discharge in piles and prolapse.

Dose.—Purgative 3 to 4 drams.

Preparation

Tablets Myrobalan—20 grains per tablet 9 to 12 tablets per dose

Nux Vomica

STRYCHNOS NUX VOMICA

Hind & Beng—*Kuchula*, Mar—*Kaja*, Tam—*Yettekkottai*, Tel—*Musti vittulu*, Mal—*Kannu ak-kum*

CHEAP REMEDIES

Nux Vomica Seeds

It is the chief source of strychnine and brucine. It contains 1·25% total alkaloids

It is an excellent gastric and general tonic. Recommended in dyspepsia, in debility and in convalescence. It improves the actions of the bowels and is therefore a valuable medicine for chronic constipation. It stimulates the heart and the respiratory organs. Useful in paralysis of reflex origin, in paralysis due to alcohol or diphtheria, in chronic paralytic affections except in those in which there are inflammations of the brain etc. It is without parallel as a curative agent in exhaustion of nerve force. It is to nerve depressions what morphine is to pains. To the exhausted, anaemic or overworked debilitated persons it is the hypnotic per excellence

Dose :—1 to 4 grains

Preparation .

(1) Tablets Nux Vomica—2 grains each

In cases of urgency, in shocks, in stimulating acceleration of the heart and in poisonings, intramuscular injection of 1/60 grain of strychnine is advisable

(2) Ampoules Strychnine 1/60 gr. in 1 c.c.

Opium**Papaver Somniferum**

Hind.—*Afiyun*, Beng.—*Afim* (also Dec Pun & Kashm), Tam—*Afini*, Tel—*Abhini*, Can—*Afimu*.

OPIUM'

The milky exudation of *papaver somniferum* obtained by incision from the unripe capsules and thickened by spontaneous evaporation

Opium is one of the most valuable medicines we possess, if properly employed. But as it is very powerful in operation it may be productive of great mischief if used without care or caution, or in unsuitable cases. The following points with regard to opium should be kept in mind

1 Some persons are very intolerant to the action of opium who are upset with the smallest doses. In these cases the drug should be avoided.

2 Infants and young children bear opium badly, still there are diseases of childhood in which it proves valuable but in these cases it should be given under medical advice

3 It should be avoided in pregnancy and should not be given to persons suffering from diseases of the kidneys, specially if there is a tendency for diaphysis

In rheumatism, tumours of different kinds, cancers, carbuncles, abscesses, ulcers of leprosy, syphilis or scrofula in which pain, specially at night, banishes sleep, opium is invaluable. The commencing dose is one grain of the extract as obtainable from bazars. If it is insufficient up to 3 grs may be given to those who are not accustomed to opium. Beyond this, it is not safe to go without professional advice. It may be efficiently combined with 2 to 3 grs of camphor

In spasmodic affection of bowels and for relieving the pain and irritation of the bladder caused by stone

CHEAP REMEDIES

it is very effective. In diabetes opium occasionally produces the most beneficial results. Vomiting is sometimes speedily relieved by a dose of opium.

As a liniment it is useful for soothing both muscular and neuralgic pains. It can be used as a liniment by mixing 15 grs. of opium in $\frac{1}{2}$ oz of cocoanut oil. It is a soothing application for painful piles. In painful toothache a grain of opium may be put into the hollow of the tooth (in this case the saliva should not be swallowed). In diarrhoea and dysentery it is mixed successfully with other astringents or is used alone.

Dose :—Opium $\frac{1}{2}$ to 3 grains.

Morphine Hydrochlor— $\frac{1}{8}$ to $\frac{1}{3}$ grain.

Preparation :

Ampoule Morphine Hydrochlor— $\frac{1}{8}$ gr. in 1 c.c

In cases of urgency morphine (the alkaloid of opium) may be given in the form of injection in doses of $\frac{1}{2}$ grain

Paraffin Soft

It is principally employed as a basis for ointments but is also taken internally as a lubricant in constipation in doses of one or two spoonfuls daily. From the therapeutic point of view it is quite as efficient as the very best and most expensive variety of liquid paraffin.

PAPAYA JUICE

Papaya Juice

Carica Papaya

Hind.—*Papaya*, Beng—*Papaya*, Bomb—*Papan*, Tam—*Pappayi*, Tel—*Bappayi*

The milky juice that comes out on scratching the surface of the raw papaya fruit contains an enzyme which can digest starch and mucous membranes and animal proteins

Papaya juice is dried at a low temperature It may be dissolved in glycerin and the solution used for internal administration as well as a lotion for dissolving warts

It is very useful in dyspepsia and liver complaints. It has got anthelmintic properties and may be rubbed over ringworm patches with success and also for round worms internally followed by castor oil

It is supposed to have emmenagogue properties It is a great help to the patient in all cases where digestion is weak or where the liver is not functioning properly

Papaya juice tablets rubbed in water and glycerin may be used as a paint for dissolving diphtheria patches The juice contains the enzyme which is superior to animal pepsin.

Dose,—2 to 10 grains

Preparation :

Tablets Papaya Juice—5 grs per tablet. 1 to 2 tablets per dose

CHEAP REMEDIES

Picric Acid

Solubility 1 in 90 of water.

A bright, yellow and crystalline powder.

Under Government rules the acid has to be stored with an equal quantity of water.

It is antiseptic and analgesic. In 1% solution, which is nearly saturated solution, it is specially useful as a first aid dressing in burns, scalds and superficial wounds. The wounds heal under the superficial scabs formed. It has all the advantages of boric acid while it relieves pain very considerably. The acid is very bitter in taste and the taste is as persistent as its colour when it comes in contact with the fingers. Stain may be removed by application of a solution of soda benzoate and boric acid. One way to avoid stain is to rub a little vaseline over the hands before handling picric acid.

Potass Bromide

Solubility 1 in 2 of water.

It is sedative, hypnotic and anaphrodisiac. It is very successfully employed in epilepsy, in hysteria and in convulsions generally. Used in insomnia due not to pain but to overwork, in sea sickness, sickness of pregnancy, nervous headache, nightmare and night screaming of children, in migraine and in neuralgia. Useful in spermatorrhœa, relieves in some cases whooping cough and asthma. In enormous doses sometimes successful in tetanus.

POTASS PERMANGANATE

Dose.—5 to 30 grains.

Preparation ,

Tablets Potass Bromide—10 grs per tablet
 $\frac{1}{2}$ to 3 tablets per dose.

Potass Permanganate

Solubility 1 : 20 of water .

A powerful deodorant, a weak antiseptic and haemostatic It is used internally in amenorrhœa and in menstrual suffering Externally as a wash for foul ulcers and as an antiseptic gargle in gums, mouth and throat affections.

In snake bites Lauder Brunton recommends that the wound be punctured and excised with a clean knife and then powdered crystals rubbed into the wound A saturated solution (1 in 20) is also an excellent application in bites of poisonous snakes and rabid dogs, if it can be immediately applied A weak solution is used as a wash in the urinary passages for gonorrhœa

It should be handled with caution as in contact with easily oxidisable substances (as alcohol, glycerin, essential oils etc.) it sets up a violent reaction sometimes attended by explosions

Dose —1 to 3 grs

Preparation

Tablet Potass Permanganate—2 grs per tablet

CHEAP REMEDIES

Punarnava

Boerhaavia Diffusa

Sans.—*Shothaghni*, Hind.—*Sant*, Beng.—*Punarnava*,
Punj.—*Itsit*, Bomb.—*Ghetul*, Tam.—*Mukuki attar*.

It is a creeping herb which grows wild and is found in fields and gardens. Its beneficial actions in dropsy and anaemia and heart diseases are being extolled from the ancient times and punarnava has passed the ordeal of modern pharmacological research.

The active principles of Boerhaavia Diffusa is a body of the nature of alkaloid called Punarnavine. Large quantities of potassium nitrate and other potassium salts are present in the plant. Dr. Chopra tried the drug carefully in 34 cases. This series, though not very large, gave convincing results about the therapeutic effects produced by the drug. It produced a marked and persistent diuresis and in some cases the ascites entirely disappeared. A number of patients on whom the drug was tried were either complicated with kala-azar or the dropsical condition was possibly due to kala-azar. In them improvement was not marked until the treatment with antimony injections was given simultaneously. The drug acts best when the dropsical condition is associated with healthy kidneys as in kala-azar or ascites caused by dysenteric conditions. As regards dropsy due to cardiac conditions its effect does not appear to be very marked. The drug appears to have

SANTONIN

a much more powerful effect on certain type of ascites than some of the other diuretics known

Dose — $\frac{1}{2}$ dram 3 or 4 times a day

Preparation

Tablet Punarnava—6 grs. 5 tablets per dose

Santonin

Santonin is a colourless, odourless and crystalline substance with a faint bitter taste. It is an alkaloid extracted from the leaves and flowering tops of a plant called *Kumala* in Hindi and *Kiranamowa* in Bombay

A variety of this plant grows in Turkestan and the harvest is practically wholly taken by Russia where there are factories for making santonin out of *Artemisia maritima* which is the scientific name of the plant. This plant grows in Kashmere and can supply Indian market. But the Kashmere State has eyes on extraordinary profits and therefore the trade in this has not been able to develop. In other Himalayan regions the plant has been discovered and there is every hope of all the santonin needed in India may be produced in India. It is a very costly article. The cost is of course artificial for the plants which grow wild, yield about one per cent of the alkaloid. The present (1939) price in India of 1 dram of santonin is Rs 1/6/- or Rs 160 per pound. Before the war its price was Rs 400 per pound and during the war it went up to Rs 700 per pound. It is therefore one of

CHEAP REMEDIES

the most costly drugs and is therefore liable to be grossly adulterated. Crystals in original phials from reputed dealers should be purchased. 1 dram original phials are available.

Santonin is a valuable anthelmintic for round-worms. It kills the thread worms as also the tape worm.

Every powerful anthelmintic is a poison and santonin is also one. It is not absorbed by the system quickly but kills the worms. It is therefore to be purged out of the system after administration.

The patient should have a purgative before taking santonin. It should be given at night. Next morning a full dose of mag sulph purgative should be given to throw out the living and dead worms as also the santonin.

Dose.—3 grains for adults, $\frac{1}{2}$ to $\frac{1}{2}$ gr. for a child, of 1 year old, 1 to $1\frac{1}{2}$ grs for a child 2 to 5 years. It should be repeated on three days successively.

Soda Bicarbonate

Soluble 1 in 12 of water

It is antacid, alterative and diuretic. Used in gout, rheumatism and urinary acidity also in dyspepsia for its valued curative influence on catarrhal conditions of the mucous membrane in moderate doses before food with bitters. To merely correct acidity it should be given two hours after food. In acute and inflammatory stages of gonorrhœa there is no better remedy,

SODA BICARBONATE AND SALICYLATE

as it renders the urine alkaline and non-irritating In bronchitis and pneumonia it renders the secretion less tenacious In influenza it has been given with success Moistened with water it is an excellent application to the sting of wasps etc. A lotion relieves itching A solution kept applied to ulcer, exercises surprising influence in promoting healing In pain due to the acid secretions of the mouth acting on decayed tooth its solution acts quickly

In all cases of diabetes given first of all 1 dram doses thrice daily with milk

Dose —15 to 60 grains

Preparation .

Tablets Soda Bicarb—7 grs each
2 to 8 tablets per dose

Soda Salicylas

There are two salts—one natural obtained from the oil of wintergreen and another prepared artificially The former has a smell—the latter is odourless

Soluble 1 1 of water

It is given as a specific in acute rheumatism in which it lowers the temperature, lessens the pain and swelling and also liability to complications It relieves pain from various causes Useful in influenza, diabetes, chronic rheumatism, mumps, sciatica and in acute tonsillitis which is so often rheumatic in origin It is a good antiseptic in fermentive dyspepsia It

CHEAP REMEDIES

slightly increases the acidity of urine. For diarrhoea and sickness in young children it is almost a specific. In early stages of gonorrhœa it is one of the most efficient drugs and should be combined with bicarbonate of soda.

It is believed to increase the quantity as well as the fluidity of the bile and is therefore combined with big doses of hexamine in alkaline solution to drain and disinfect a septic gall bladder.

Dose .—10 to 30 grs.

Preparation :

Tablets Soda Salicylate—5 grs per tablet.
2 to 6 tablets per dose.

Sulphur

Insoluble in water.

It is an intestinal antiseptic. It is efficacious in chronic rheumatism, gout and many skin diseases. Externally it is used for skin diseases such as scabies, ringworm and acne.

Given in 1 grain doses in cachets in typhoid 5 or 6 times during 24 hours the temperature quickly falls and follows a more regular course as a result of antiseptic action.

Dose .—20 to 60 grains.

Preparation :

Tablets Sulphur—8 grs. each.

AJOWAN : THYMOL

Ointment Sulphur

Sulphur	.. 1 dr
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Soft Paraffin	1 oz
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For external use

Thymol

Obtained from the oil which comes out on steam distillation of Ajowan.

Solubility

1 , 1500 of water ; 1 2 of olive oil

A saturated solution in water is a very powerful antiseptic Used as an intestinal antiseptic in diarrhoea and typhoid fever It is used as an inhalation in laryngitis and bronchial affections and for many other conditions where carbolic acid is useful Kills intestinal parasites specially the hook worms.

Dose —Antiseptic— $\frac{1}{2}$ to 4 grs

Anthelmintic—15 to 30 grs.

Preparation

Tablets containing $\frac{1}{2}$ gr. of thymol with 5 grs of soda bicarb are sold as Ajowan tablets in the bazar These tablets are very useful in indigestion 8 tablets put into a pound of water will make an excellent antiseptic alkaline solution for mouth wash A few grains of borax may be added with advantage.

(1) Tablet Thymol Soda

Thymol	.. $\frac{1}{2}$ gr
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Soda Bicarb	.. 5 grs
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CHEAP REMEDIES

(2) Tablet Bo₁₀ Thymol Alkali (Mouth Wash)
 Borax—3 grs., Thymol— $\frac{1}{2}$ gr., Soda
 Bicarb—5 grs. Made into tablets
 4 tablets per 8-ozs. of water.

Tartar Emetic

Potassium Antimonyl Tartrate

Sol—1 17 of water.

Diaphoretic, expectorant, emetic and depressant.
 Useful in head symptoms of acute febrile diseases As
 a diaphoretic and expectorant it is given with great
 effect in the early stages of acute pneumonia, bronchitis
 and croup.

It is used intravenously in 2% solution (from $\frac{1}{2}$ c.c.
 increased to 5 c.c. bi-weekly) as a specific for kala-azar
 Organic preparations of antimony under different trade
 names are being used for intravenous injection in
 kala-azar. Those commonly known are urea
 stibamine, stiburamin, stiburea, stibosan etc. These
 injections are definitely contra-indicated in acute
 inflammatory conditions of the lungs, liver and kidneys
 Even in chronic cases of inflammation it should be
 given with care. Tartar emetic in 2% solution has
 been found to be efficacious in filariasis or
 elephantiasis The fever subsides and the swellings
 also subside after several injections.

Neo-stibosan and neo-stiburea may be given
 intramuscularly

OIL TURPENTINE

Dose -- Diaphoretic 1/32 gr to 1/8 gr
Emetic $\frac{1}{2}$ gr to 1 gr

Preparation

1. Tablets Potass Antim Tart—1/12 grain each
- 2 Ampoules Potass Antim Tart—2% sol $\frac{1}{2}$ to 5 c c

Turpentine Oil

Volatile Oil

Obtained by the distillation of exudation from pine trees

Antiseptic, deodorant, expectorant, haemostatic, diuretic and anthelmintic 2 to 4 drams in equal quantity of castor oil is often successful in removing tape worms Useful in passive haemorrhage from the various organs Antispasmodic in hysteria and hiccough It is used as an inhalation in lung diseases and as an enema with castor oil in case of obstinate constipation, for flatulence and tympanitic distension of bowels and also thread worms Externally rubefacient and counter irritant Employed as a liniment in chronic inflammatory pains such as pleurisy, bronchitis, lumbago and rheumatism and as a fomentation (turpentine stupes) in painful abdominal distension In obstinate inflammatory or semi-inflammatory eye conditions it is an useful remedy in 3 minims doses by mouth every night

Turpentine 10 minims in mucilage for the hiccough of typhoid fever affords relief. It is strikingly

CHEAP REMEDIES

useful in arresting bleeding Applied in the form of spray it destroys all sorts of vermin as body lice Even sheep skin may be cleared of vermin by this method.

Dose — 3 to 10 minims.

As an anthelmintic 2 to 4 fluid drams usually given in acacia mucilage

Turpentine stupes :—A piece of old clean cloth or flannel is wrung out of very hot water, sprinkled with a few drops of turpentine and applied to the affected parts in various forms of acute and chronic inflammation

Ulat Kambal

Abroma Augusta

Hind, Beng & Cutch — *Ulat Kambal*, Bomb — *Olak Tambol*.

This plant grows wild throughout the hotter parts of India It is kept in gardens also for its scarlet flowers. The tender roots and root bark are being prized from ancient times as emmenagogue. It is used effectively in dysmenorrhœa. Some research work was undertaken in the School of Tropical Medicine but nothing is in record to establish or dispute its value In the meantime it continues to enjoy great popularity Many patients have got great benefit out of it. It has been found to regulate menstrual flow and act as an uterine tonic.

ULAT KAMBAL VASAKA

"The root bark is emmenagogue and uterine tonic. The action of the dried root as well as the sap of the fresh root has been studied in my laboratory. It showed marked uterine contractions. The active principle of the drug totally destroyed if mixed with alcohol or any other preservative"—Dr K C Bose *Pharmacopœia Indica*, 1932

It should be given from a week before or during the menstruation "A single administration during menses generally cures the disease and brings on conception in young married women"—Bose

Dose —30 grains

Preparation

Tablets Abroma Augusta—6 grs each
5 tablets per dose Once daily

Vasaka

Adhatoda Vasica

Sans—*Vasaka*, Beng—*Basak*, *Baksh*, Hind—*Ausha*, Guz—*Adulso*, Mar.—*Adulsa*, Tel—*Addasai am*, Tam—*Adhatodai*

Dried Vasaka Leaves

Vasaka has a considerable reputation all over India as an expectorant, antispasmodic and is largely prescribed in consumption and other chest affections attended with cough and hectic fever. The ancients were full of praise for the virtues of vasaka and the

CHEAP REMEDIES

most modern experiments confirm that the praise bestowed on vasaka was not in vain.

Vasaka contains an active principle vasicine which has a slight but persistent broncho-dilatory effect produced by the depression of the nerves of the heart, lungs etc. It liquefies sputum, makes it easy to come out. It also relieves bronchial spasm and is a useful remedy in asthma.

Vasaka contains an essential oil which has antiseptic properties and that also helpfully acts on the system.

Dose —20 grains.

Preparation .

Tablets Vasaka—5 grs. each. 4 tablets per dose

Resin Ointment

Resin is an adhesive exudate from pine trees. In United Provinces large quantities of resin are manufactured. It is soluble in alcohol and volatile oils and insoluble in water.

Resin ointment is an antiseptic and mildly stimulant. It is very helpful in healing indolent ulcers, wounds, burns, fistulae and sinuses. It should be applied before dressing after washing the wounds, ulcers etc. with neem or copper sulphate lotion.

Preparation :

Resin	...	$\frac{1}{2}$ oz
Til Oil	...	1 oz

RESIN OINTMENT

Til oil is melted and resin is put into it and heat continued till the melt is homogeneous Allow to cool down When slightly warm throw the melt on water in a mortar and rub the melt with water This will emulsify the mixture Kneading should be continued in a mortar with frequent changes of cold water The more it is kneaded, the more water will be absorbed. Eventually the weight of the product is 9 to 16 times the weight of resin This may be stored Water may partially separate out during storing which may be thrown off

CHAPTER—X

EXAMINATION OF THE PATIENT

Examination of Stools

Fæces are not wholly food residue left after absorption of absorbable material. On the contrary, fæces consist largely of excretory substances from the intestinal walls and of bacteria. There is a portion of food residues of course but this is small in quantity. This quantity is more in vegetarians due to the inclusion of larger quantities of roughage in food. In diseased condition of the stomach as in diarrhoea, fæces may consist of much undigested foods. Up to 30 per cent of fæces may consist of dry bacteria only.

Concentrated foods like milk and milk products are practically completely digested and absorbed. Starch or rice is very materially absorbed, leaving only a little refuse. Cellulose is not digestible and in the form of roughage makes greater bulk and weight of fæces of those who live on vegetables and fruits.

It is not possible to clearly establish the nature of the food which has been taken from the character of stool. But abnormal stool often gives valuable indication of what is wrong with the system.

EXAMINATION OF STOOLS

The faeces may be diluted with water and ground and passed through cloth. Whatever remains on the cloth will reveal the character of the solid residual matter.

The colour will reveal whether there is excess or shortage of bile. Excess of bile gives green and variegated colour to the stool whereas shortage of bile is indicated by whitish or grey colour and porous or spongy appearance and foul smell. Blood tinges stool red or black. Indigestion exhibits itself by showing of undigested material. Diarrhoea is indicated by frequent stools. Mucus indicates infection of the intestinal canal due to dysentery or typhoid. Watery stools are characteristic of choleric diarrhoea or cholera. Hook worms or other intestinal worms will be discovered on examination of the separated residue. Mucus and other matter will also be observable here.

The normal odour of faeces depends on the presence of some chemical substances which is more intense when more of meat is ingested. Infection of the intestines also gives noxious odour to faeces. Again absence of bile favours putrefaction. Stools in jaundice are therefore very offensive. In certain fermentative changes the faeces take sour smell.

In constipation the stools are drier and harder than normal. In diarrhoea the stools get fluid. The more the diarrhoea, the greater the fluidity. Slimy stools indicate presence of mucus.

EXAMINATION OF THE PATIENT

The hard stools of constipation are often coated with mucus and are rounded, these having taken off patches of lining while passing through the intestines.

The shape of the stool may give further indication. In obstruction the stools may be flattened out like ribbons; In ascites when the bowels are pressed by the fluid in the peritoneum, faeces may get flattened. If there is a polypus in the rectum, the faeces may get furrowed.

Examination of Urine

For proper testing urine passed during 24 hours should be collected. If however only one sample is to be taken, then that passed 3 or 4 hours after taking food should be collected.

The normal quantity of urine passed by adults is about 50 ounces a day. The quantity varies with season being more during rains and winter and less during summer season. More urine is passed during day the proportion being 38 ounces of day, 12 ounces of night.

Normally urine is of pale yellow colour having a specific gravity of 1015 to 1020. The reaction is acid and turns the blue litmus red. If decomposed, it becomes alkaline.

The urine throws down some sediments often and these may be quite harmless. Mucus settles down at the bottom and is more or less woolly in appearance. Phosphates form a white "chalky" deposit even in

EXAMINATION OF URINE

alkaline urine. These are easily dissolved by addition of dilute acid like acetic acid

Pus may look like phosphates but is not dissolved by acid

Urates also throw deposits even in healthy urine
They dissolve on heating

Albumen and sugar are abnormal constituents of urine and are produced by pathological conditions
These may be chemically detected

For albumen the reagent required is pure strong nitric acid. If this acid is put in a test tube and a little urine is introduced along the side of the tube with the help of a burette, then at the point of contact between the acid and urine a white ring is formed. This is very characteristic. The same test will discover the presence of bile in urine when the surface of contact shows a play of colours

For detecting sugar, its property of reducing a solution of copper salt is utilised. Two solutions are used called Fehling's solutions No 1 and No 2

Solution No 1 105 grains of copper sulphate are dissolved in 100 c.c. or a little over 3 ounces of water

Solution No 2 One ounce of sodium potassium tartrate (Rochelle salt) is dissolved in 2 ounces of hot water and filtered. Add to this $\frac{1}{2}$ ounce of caustic soda and make up the bulk to 3 ounces

Equal parts of No 1 and No 2 solutions are taken
The solution is deep blue colour Boil and while

EXAMINATION OF THE PATIENT

boiling add urine drop by drop. If sugar is present a greenish, yellowish or reddish precipitate will form. Blue cupric hydrate solution is reduced to cuprous hydrate or cuprous oxide which is thrown out as precipitate.

Examination of Sputum

General appearance :—Rusty, scanty and sticky in lobar pneumonia ; thin and mucoid in acute bronchitis ; thin, reddish and brown in liver abscess ; yellowish, pus-like in empyema bursting into the lung.

Smell —Sometimes the sputum may be offensive as in abscess or gangrene or in pulmonary cavity.

Examination of Abdomen

The abdomen may show a general distension due to accumulation of fat or gas in the stomach or fluid in the peritoneal cavity. Bulging out of the abdomen may be due to diseased condition and enlargement of the liver and spleen ; fat is associated with obesity. Flatus or distension owing to accumulation of gas is due to intestinal fermentation. Gastric or pyloric fermentation may also cause distension, but this is rarer. Gas in the stomach is thrown out by eructation or belching while that from the intestines passes out with more or less sound through the rectum accompanied by foul odour known as passing of flatus.

EXAMINATION OF ABDOMEN

Accumulation of fluid points to ascites or general diopsical condition. Dropsy may be due to disease of the heart or of the liver or kidneys. The abdomen may be distended on account of advanced pregnancy. Intestinal obstruction and peritonitis also may cause distension of abdomen. Tumours may distend the abdomen. In all distensions the umbilicus is flattened or turned out.

Enlargement of the liver, stomach or gall bladder may distend the upper part of abdomen, whereas the lower part may be distended in women on account of ovarian or uterine tumours.

The abdomen may appear shrunken on account of wasting diseases or general malnutrition.

Streaks —The skin of the abdomen may show streaks as evidence of previous distension. Whitish streaks are seen radiating out in the lower abdomen. This is due to distension due to pregnancy or to ascites.

Pigmentation —In pregnancy a black line runs along the middle of the abdomen. In disease of the adrenal glands or Addison's disease there is pigmentation of abdomen which is a characteristic accompanied by loss of muscular strength and exhaustion.

Hernia —The intestines may protrude out through the umbilicus. This is generally reduced simply by pressure.

Distension of Veins —The veins may get distended and show themselves out prominently on the abdomen. Obstruction in venous flow is due to hardening of

EXAMINATION OF THE PATIENT

the liver, if the flow of vein is upwards. If the veins flow downwards then there is obstruction in vena cava.

Movements :—The abdomen moves with the respiration. This movement which is partly thoracic and partly abdominal is disturbed in diseases. In peritonitis, the abdomen refuses to respond to respiration or the movement is stopped or is greatly reduced.

Palpation of Abdomen .—The abdomen should be explored or felt with the pressure of the hand. The patient lies on his back with the knees flexed a little. The hand is placed on the abdomen. The muscles generally recoil at the unaccustomed touch. The examiner should warm his hand to body temperature and touch lightly and superficially in order to take away the nervousness of the patient. The process of exploring the condition by feeling with the hand is called palpation. If there is resistance or tenderness on palpation, it will indicate existence of some disease of the nature of inflammation in the organs in the cavity. Enlargement of organs like the liver and spleen is felt by palpation. Faecal matter in hard lumps may be felt in the colon as also tumours in the viscera.

Abdomen may be explored by percussion or flicking. It is done by placing the left hand middle finger on the abdomen. The finger is then stroked with the middle finger of the right hand. By flicking the entire abdominal area, much knowledge about the

EXAMINATION OF ABDOMEN

condition of the abdomen may be obtained. The sound produced and felt on stroking is either dull or resonant. The presence of organs like the liver or spleen under the finger makes a dull sound. By flicking the area covered by the liver and spleen may therefore be mapped out.

If there is a thrill on a stroke, it will indicate the presence of fluid. If there is inflammation then also there will be localised dullness and localised peritoneal inflammation which may be spotted this way.

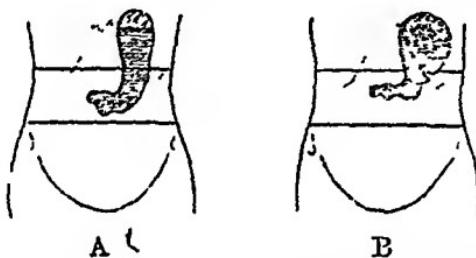


Fig 209 A Position of the stomach while standing,
B " " " lying down.

Examining with the Stethoscope — In pregnant women an examination with the help of stethoscope will give heart sound of the foetus if it is seven months old or above.

Stomach — The normal stomach is placed just below the diaphragm, the orifice being about 1 inch to the left of the seventh rib and nearly three and a half inches deep below the surface. The fundus of the stomach however reaches a little above the apex of the heart under the diaphragm. The greater curvature of the stomach when distended may reach the umbilical

EXAMINATION OF THE PATIENT

line. If it reaches lower than that it is to be regarded as a dilated stomach.

Approximately five-sixths of the stomach are situated to the left of the middle line and only one-sixth is to the right of the middle line.

The pylorus is covered by the right lobe of the

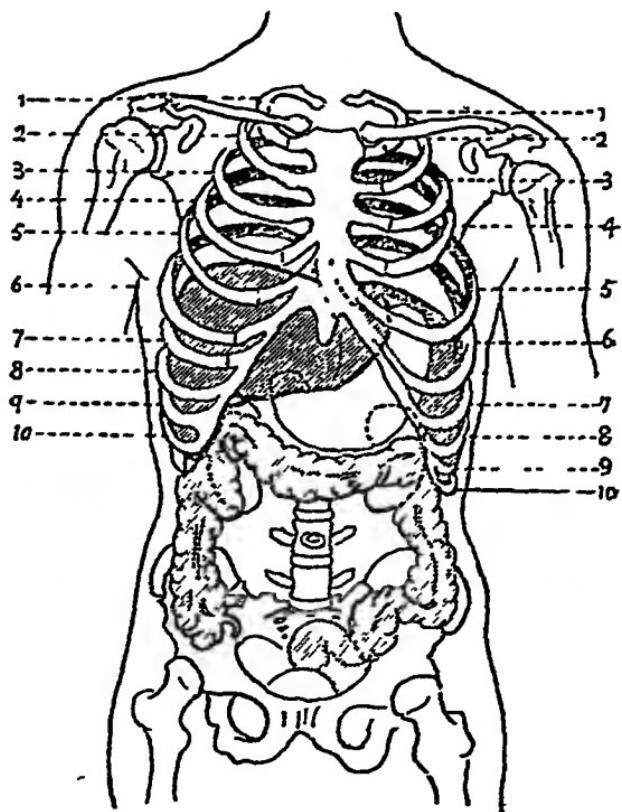


Fig 210. Diagram showing relative positions of the liver, stomach, spleen and large intestine anteriorly. 1-10 ribs.

liver and is situated nearly one and three-fourth inch to the right of the median line and opposite the joints of the seventh and eighth ribs. The position of the pylorus varies with persons and sex.

EXAMINATION OF ABDOMEN

The normal shape of the stomach is like a J, a little inclined to the right. When the inclination tends to be less or approaches vertical, the stomach empties quicker than in 3 hours which is the average time of emptying. In such cases a smaller quantity of food gives fullness and in three hours after a meal there is a feeling of hunger. When the inclination tends to be horizontal then there is delayed emptying, the appetite is poor and there is a feeling of fullness even during a meal. Weakly persons may have such a stomach. On examination if the peristalsis or squeezing movement is visible, it will indicate an obstruction at the pylorus.

Splashing Sound — This sound is obtained by bringing the ear near to the surface of the stomach and by making sharp dipping movements by pushing in the right side while the left side is held by the other hand.

It may be obtained in the normal stomach with lax abdominal wall after a meal. But if this sound is obtained 4 or 5 hours after a meal and below the umbilicus it indicates that the stomach is dilated and that there is stagnation of flow.

The Intestines

The duodeno-jejunal flexure is situated at the level of the second lumbar vertebra to its left. The cæcum is situated on the line joining the iliac prominence with the umbilicus at the middle of it. The

EXAMINATION OF THE PATIENT

umbilicus is situated between the third and fourth lumbar vertebrae.

In diseased persons the stomach may descend

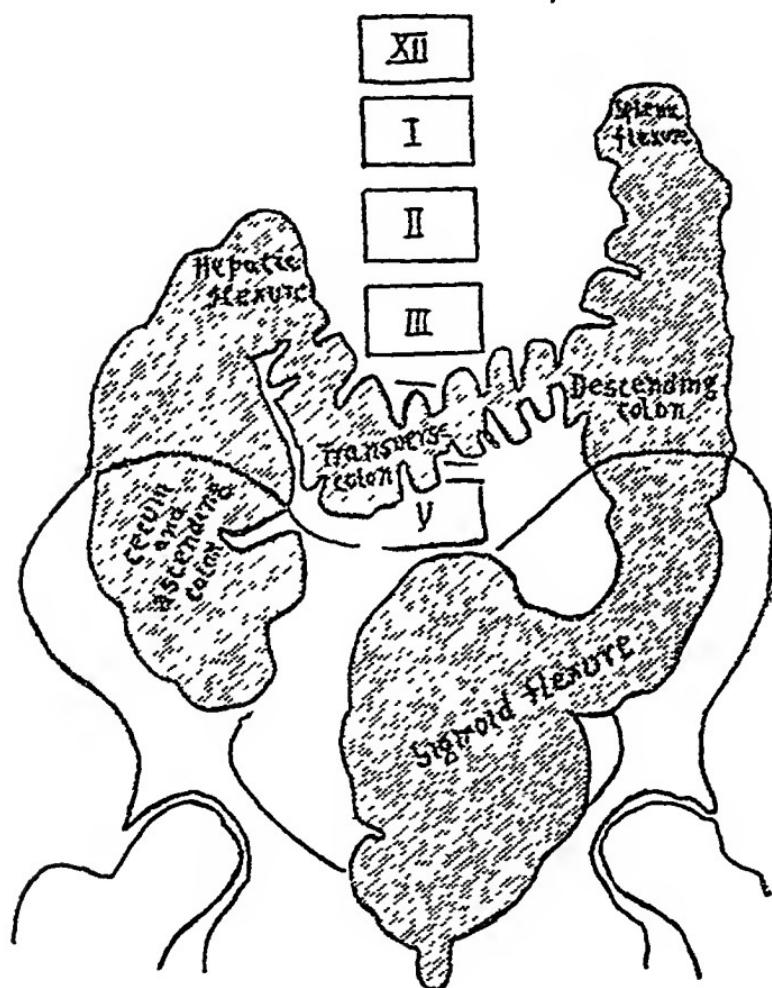


Fig 211.
Large intestine with flexures

nearly into the pelvis. Pelvic cæcum and dropped colon are responsible for chronic constipation, flatulence, poor appetite ; a dragging sensation, back-ache and

EXAMINATION OF ABDOMEN

neurasthenia A dropped kidney may cause periodic pain of a severe nature

In disease and in emaciated persons the peristalsis of intestines may be visible, the coils of intestines then stand out

Examination should be by palpation. This will discover flaccidity, rigidity or tenderness of the abdominal wall. The orifices of hernia are to be examined to find out its condition and that of the cord

In case of chronic bowel disease the rectum should be examined. The patient lies on his left side with the right thigh drawn up. The orifice is to be examined by separating the folds. External piles show bluish bead-like projections. If there was syphilis it is likely that some marks of injury will be found in these regions. Condylomata or whitish hard elevations more or less symmetrical and close to the orifice are associated with secondary syphilis. Fissures, ulcers and fistulae may be discovered here.

Examination may be conducted by passing the lubricated finger inside and the condition of the sphincter ani felt as to whether there is spasm or relaxation in it. Piles, polypus and intussusception may be detected here. Examination should also be made to ascertain the condition of the prostate. Ulcers and strictures will be discovered here, if present.

EXAMINATION OF THE PATIENT

In amoebic dysentery the sphincter is normal and the membrane is folded. Small painless ulcers and strictures due to dysentery may be located. In chronic cases of amoebic dysentery minute oval pits or depressions are present. In bacillary dysentery the sphincter is either contracted or lax and the membranous folds are absent. The place is full of painful easily bleeding tissues.

Rectal examination may show ulcers or strictures. These may be syphilitic specially in young women. Ulcer and scars may make a hard mass encircling the anus and spreading to vagina. Ulcers due to cancer may be present in the rectum. There is then a general malnutrition. These ulcers are very painful. Multiple ulcers with fistulae due to tuberculosis may be present. The stool then contains blood, mucus and pus. This may be the consequence of pulmonary tuberculosis.

Examination of the Liver

Liver is situated on the right side in the hypochondric region. It covers a portion of the epigastric region also. Looking from the front, it will appear like a bow the top curved line extending from the right flank along the fifth rib at the top and then extends past the sternum. The base follows the profile of the ribs up to the right 10th rib extending to the margin of the 8th rib and then crosses epigastrium below the sternum and extends to the fifth left rib.

EXAMINATION OF THE LIVER

On the back it is a triangular area, the apex being a little below the axilla. One side of the triangle runs along the flank and the other side at right angles to it, both being about 6 inches in length. The base is rounded at the corners. The upper border of the liver is overlapped by lower margin of the right lung.

Percussion — The border of the liver may be

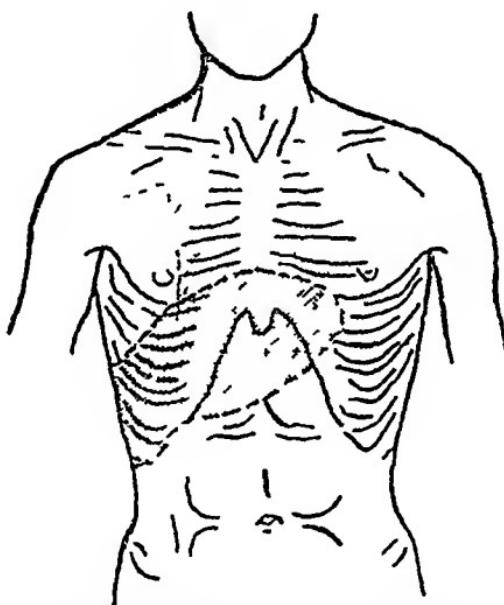


Fig. 212 Anterior surface of the liver.

outlined by percussion. For this purpose three fingers of the right hand, the fore, middle and ring fingers should strike with full weight on the middle finger of the left hand laid flat on the surface. Dullness indicates area occupied by the liver.

Percussion should be practised along a series of vertical lines from above downwards. The upper line

EXAMINATION OF THE PATIENT

of dullness begins at the fifth right cartilage. If there is definite dullness above the fifth rib or above the angle of the scapula on the back, then it will indicate enlargement of the liver at its convex surface.

Palpation. — Palpation is useful in finding out the lower border of the liver and in examining enlargement. In children the lower border extends

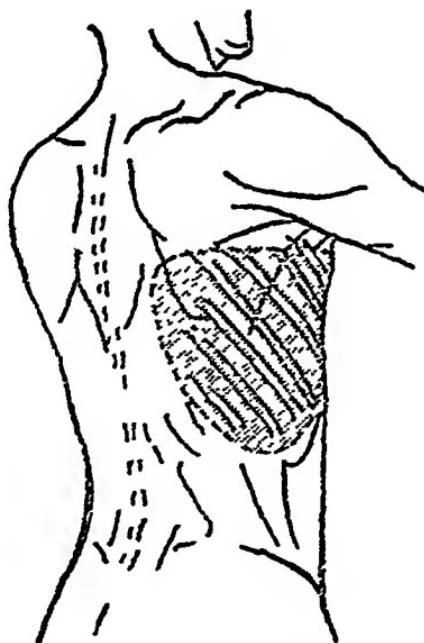


Fig. 213. Posterior surface of the liver.

considerably below the costal margin. The margin of the liver coincides with the costal margin at about the sixth year and with advance of age, the liver gets concealed under the ribs except when standing. Then it extends about half an inch below the rib.

In examining the patient while lying down, the knees should be kept flexed so that the abdominal

EXAMINATION OF THE LIVER

muscles are relaxed. The patient should breathe through the mouth. Sit on the right side of the patient facing him. Put the fingers of the left hand slipped to reach the spinal column while the left thumb is applied anteriorly over the last rib. The right hand is put on the abdomen to depress the umbilical region. The fingers are worked gradually upwards depressing the anterior abdominal wall so that the margin of the liver is touched as it comes down at each inspiration. If the patient takes deep breath the lower margin is pushed further down and its presence felt by the fingers.

The patient may be kept sitting up. The examiner approaches him from behind and his right fingers are dived at the costal margin. The patient is asked to take a deep breath when even slight enlargement is detected.

The liver weighs $1/18$ th of the body weight at birth but the proportionate weight is reduced to $1/36$ th in adults. If the liver is enlarged it may be palpable if the enlargement is upward as usually happens in case of hydatids. In most cases the enlargement is observable downwards.

In kala-azar there is some enlargement. In chronic cases there may be considerable enlargement. The liver is fairly hard. In malaria also enlargement may occur. This may disappear when the fever ceases. The liver of malaria is softer than that of kala-azar but on repeated attacks this too becomes as hard as in the case of kala-azar. Sometimes the

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enlargement and hardening due to malaria become permanent.

In syphilis the liver becomes hard and enlarged. In attacks of amoebic dysentery the liver may get enlarged, hardened and inflamed, abscess may also form in this case as also in alcoholic and syphilitic liver. In majority of cases the right lobe is affected. There may be cirrhosis of the liver in which the liver gets fibrous, hardened and subsequently shrunken. The cause may be gastro-intestinal toxin. Gastric symptoms appear early, the eyes gradually get yellow. Piles may appear and later on ascites shows itself. The patient looks sallow and has a big abdomen with slightly dropsical ankles. Various complications may follow which may be treated early with success, but all advanced cases invariably end fatally.

Examination of the Nose

An examination of the upper respiratory passages, the nose, pharynx and larynx should not be neglected as they are very frequently diseased and as their diseased condition explains the origin of many disorders of the respiratory tract such as dyspnoea, cough, expectoration, asthmatic paroxysms etc

The outer appearance of the nose may often suggest an internal defect. The nose may be deviated sidewise or there may be a depression or a traumatic deformity. A narrow nose may be due to adenoids. An upturned nose due to destruction of the septum is

EXAMINATION OF THE NOSE

often of syphilitic origin A red nose indicates circulatory disturbance while the bulging of the tip in breathing indicates dyspnoea

The tip of the nose is raised with the thumb and the vestibule is inspected (Figs 214-215). Care should be taken to see whether there is obstruction due to deviated septum or polypoid growth. Skin disease like eczema should be noted. The character of the mucous membrane and the condition of the bones should be examined.

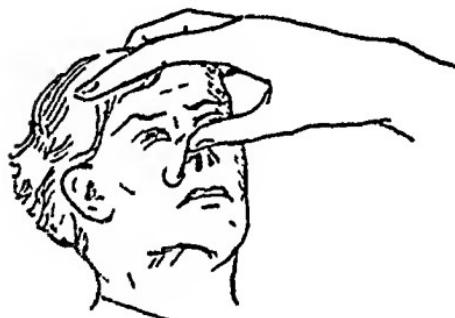


Fig 214 The tip of the nose is raised with the thumb

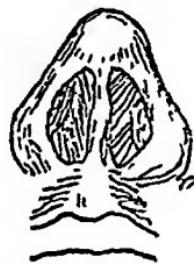


Fig 215 The nostrils.
Anterior extremities of inferior turbinates are visible

The nose may be affected by acute rhinitis or what is known as common cold. It is due to infective attack of the membrane of the nose. The infective organisms cause chilliness followed by malaise, languor and also slight fever. The membrane discharges watery fluid and then this becomes thicker. The inflammation may extend down to the throat, larynx, trachea and thence to bronchi. This symptom may remain chronic due to repeated attacks.

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The nose may have shown a diseased condition due to congenital syphilis. The nose may be filled with thick discharge a few months after birth. Then gummatous inflammation may destroy nasal cartilages and the bridge of the nose may be flattened.

Tuberculosis may attack the nose in form of lupus in the anterior part of the septum or on the turbinals or on the nasal wall. Small nodules are seen. Leprosy may form nodules on the septum which eventually may break the cartilages causing depression of the nose.

Examination of the Throat

The physical features of the pharynx are shown in Figs. 216 and 217

The first thing in the examination of the pharynx should be an examination of the neck for enlarged lymph glands. This is of importance in the diagnosis of various forms of throat cancer and syphilis. The patient should face window through which strong daylight is coming. The mouth should be opened and a rapid survey should be made of the oral cavity, teeth and the palate.

The first thing would be to ask the patient to open his mouth wide and protrude his tongue. By this process the tonsils are exposed. Sometimes the epiglottis comes into view. The examiner may gently keep the tip of the tongue pulled out. The patient is directed to utter the sound 'ah'. The uvula rises and tonsils become visible as they normally are.

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EXAMINATION OF THROAT

If by this method the throat and tonsils are not fully exposed to view then the tongue should be depressed with the handle of a spoon. The handle is to be warmed and the warmth felt on the posterior

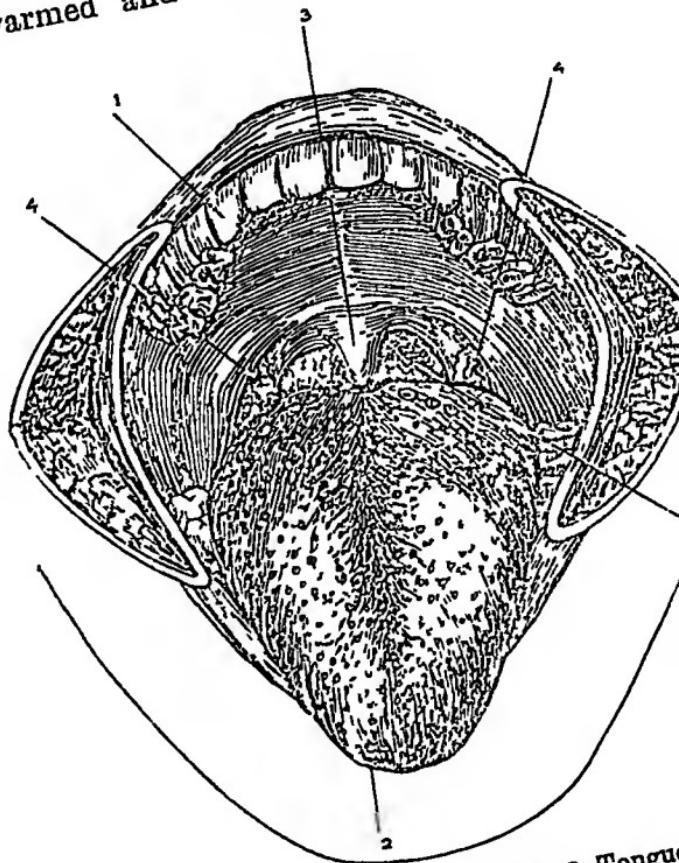


Fig 218 The oral cavity
1 Teeth, 2 Tongue
3 Hard palate
4 Tonsils, 5 Posterior pharyngeal wall

surface of hand so that it may be just temperature. The tongue is depressed while the examiner holds a candle and reflects the light into the throat.

EXAMINATION OF THE PATIENT

of another spoon. An electric torch is very convenient for lighting the oral cavity.

Observation of the disturbances of deglutition, pronunciation, respiration, cough, expectoration and of voice is of great importance in arriving at what is

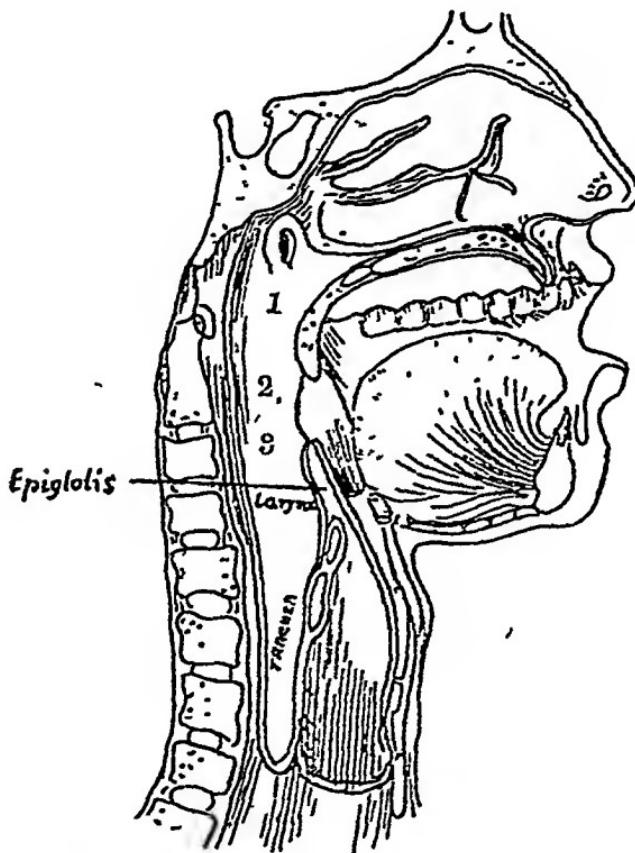


Fig 217. Section through mouth. 1. Nasopharynx,
2. Oropharynx, 3. Laryngopharynx.

wrong with the patient. These may be classified as painful throat, the causes of which may be acute pharyngitis due to eruptive fevers or diphtheria or syphilis, or tonsillitis or ulcers. There may be hacking and ticklish cough due to pharyngitis or tonsillitis.

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There may be a sensation of a ball coming up and closing the throat This is common in hysterical females

There may be alteration of voice on account of some growth in the nose or paralysis of the soft palate due to diphtheria Or there may be hoarseness due to pharyngitis or laryngitis

The examiner should on having the oral cavity exposed observe the colour, when effect of inflammation will be visible Exudations should be noted. Diphtheria will exhibit characteristic adherent membrane with patches in the tonsils, pillars of fauces, uvula and soft palate Measles, small pox, chicken pox etc will exhibit eruptions Granulations will be observable in cases of chronic pharyngitis

Swelling may be observed due to a general dropsical condition or there may be swelling with inflammation due to some infective disease such as cellulitis

Instrumental aid is necessary in order to examine the interior of the larynx In affections of the larynx the most prominent thing is the change of voice or hoarseness There are also pain and cough Inflammation of the larynx or laryngitis often accompanies an attack of cold It often appears with infective fevers such as small pox, measles, influenza and typhoid fever Gout, alcohol and smoking are predisposing causes Laryngitis may appear in a chronic form in public speakers, singers and hawkers Phthisis often induces laryngitis as a late complication The larynx gets ulcerated and becomes pale There

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are cough and hoarseness due to interference in the normal action of the vocal cords.

Examination of the Lungs

The lungs are encased in the chest. The healthy chest may be distinguished from an unhealthy one by inspection. It is symmetrical on both sides of the sternum and is smooth without deep hollows and shows a slight recess below clavicles. In section it is elliptical, the sides being wider apart than the depth from front to back. In children the section is more nearly a circle.

The sternum is a little convex when viewed from front and ends in a little furrow. The end of the sternum projecting a little is always palpable and is sometimes visible. In the adult male the nipple is about 4 inches from the middle line in the 4th intercostal space. Generally the right side is more developed than the left.

Alar chest :—In abnormal chest the abnormality may vary variously. The vertebral borders of the scapulae may project unduly and the shoulders may droop as the result of a long and shallow thorax. This is associated with long neck and prominent throat. This form of chest indicates proneness to lung diseases.

Flat chest :—The chest may be flat on account of the ribs having lost their proper convexity. The sternum is then at a less than normal distance from the spine. This form always points to proneness to lung diseases.

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There are other chests which are deviated from the normal, pointing to effects of disease in the past. The rachitic chest falls in this group. In this form of deformity the bones are unusually weak and are therefore readily deformed due to any applied force. During inspiration the cartilages bend inwards due to pressure of external air. A vertical groove is formed in this region.

The deformity may make the section of the chest more a triangle than an ellipse, the apex of the triangle being at the sternum. Such a breast is called pigeon breast.

In emphysema the volume of the lungs increases and they therefore require greater space. This is met by allowing the ribs to be less oblique than normal and by the spine bending forwards and the sternum arched. These are effected at the sacrifice of the range of movement of the chest as a whole. The diaphragm has to do more than usual work. The altered shape of the chest becomes prominent and is called barrel-shaped chest.

Only one side of the chest may be either swollen or sunken indicating diseased condition. Enlargement is generally due to accumulation of fluid or of gas in the pleura. One of the lungs may get hypertrophied or there may be a tumour. These will also cause enlargement.

The whole of one side shrinks in volume from shrinking of the lung. Tuberculosis may cause this or it may be due to adhesions during an attack of

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pleurisy. Collapse of a lung from bronchial obstruction may also lead to this.

A part of a side of the chest may bulge, shrink or get depressed. Emphysema, tumours and diseases of the heart may cause these localised bulgings.

Respiration

The normal rate is 16 to 18 per minute and the pulse respiration ratio is 4 to 1. The rate is disturbed in various diseases. In fever for every degree rise of temperature the pulse rate is increased by 10 and the respiration by 3 per minute.

If in normal state at 98°F, the pulse is 72 and respiration 18, at 100°F or by rise of 2 degrees, the pulse will increase to 92 and the respiration to 24 per minute.

In pneumonia the respiration rate is increased rising to 2:1 or more. Normally expiration immediately follows inspiration and there is a pause for the inspiration to commence after an expiration.

In abnormal conditions the inspiration may be prolonged. This may be due to obstruction in the air passages such as in the larynx, the trachea or in the bronchi caused by foreign body, diphtheria, bronchitis, asthma etc. The expiration may be prolonged by diminished recoil of the lungs such as in bronchitis or emphysema. The breathing may be disturbed in another characteristic way called Cheyne Stokes breathing. In this the respiratory movement increases

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till it reaches a maximum and then it gradually falls and in the end stops entirely and is then followed by another similar phase. This may be due to heart disease where there is a failure of compensation or in heart block. It may happen in uræmia, in narcotic poisoning such as with opium, in meningitis, in tumour of the brain or softening of the brain. In any case the prognosis is grave.

The breathing becomes short and interrupted in pleurisy, in fractured rib, in asthma or in hysteria. The breathing may be stridulous on account of spasm or obstruction in the larynx or it may be stertorous in enlarged tonsils and adenoids or paralysis of the soft palate.

Normally breathing is accomplished with the help of both the thorax and abdomen. In males and in children of both sexes the abdominal muscles and the diaphragm play a greater part than in females in which cases the respiration is more thoracic. The abdominal character of respiration may be enhanced due to disease. Any disease that interferes with the movement of the chest increases the abdominal respiratory movement. This happens in pneumonia, in pleurisy and fracture of the rib which make the movement of the chest painful. This will also happen in paralysis of the intercostal muscles or their spasm. If the joints of the ribs become calcified or stiff or if there is emphysema obstructing movement of the chest then also the character of respiration will be abdominal. On the contrary, respiration may assume

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thoracic character on account of pain or disease in abdomen or paralysis of the diaphragm.

In examining the chest the total quantity of expired air after full inspiration will give indication about the healthy working or otherwise of the lungs. This may be measured by filling a narrow mouth vessel with water having about 8lbs. capacity and keeping it inverted over a basin. After full inspiration the breath is thrown out by the mouth through a tube leading to the inverted vessel preferably a glass jar.

The volume of air finding its way into the inverted bottle is the measure of the capacity of lungs in expiration. Normally it is equal to a volume of 5 or 6lbs. of water or say half a gallon. This volume is diminished in those diseases of lungs and chest in which the lungs cannot fully expand. It is also diminished in heart diseases.

The amplitude of movement of the chest may be measured by a tape noting the markings in inspiration and expiration. The difference in the two measures should at least be 2 inches in males and $2\frac{1}{2}$ inches in females.

The amplitude of movement is diminished in diseases causing pain such as pleurisy which is an inflammatory condition of the pleura or it may be due to muscular pain in the intercostals.

Air space of lungs may be diminished by consolidation of lungs, by formation of cavity and also by tumour. Pressure on the lungs due to pleural

PERCUSSION OF THE LUNGS

effusion or pneumothorax or enlarged liver may also cause the amplitude to be diminished

Percussion of the lungs.—The patient stands or sits upright for frontal examination. The hands hang loosely. For examining the back the hands are crossed. For percussion of the axilla the hand should be placed on the head.

Percussion is used for determining the boundaries of the lungs and their condition. Resonance of the lungs will indicate their normal or abnormal condition. Resonance may be quantitative that is there may be increase of resonance or hyper-resonance or diminution of resonance or dullness. The resonance may vary in quality being high-pitched, medium or low-pitched. Resonance may also be characterised as that of cracked-pot or bell sound.

Percussion is made by striking the surface to be examined by the tip of the right middle finger. The hand is to play on the wrist, the elbow joint remaining unmoved. The middle finger may be allowed to strike directly on the surface. This is done in examining the apices of the lungs under the clavicles. But generally the stroke is applied on the fingers of the left hand which are placed in firm contact with the surface adapting themselves to any inequalities of surface. There should be no air space between the fingers and the skin. The back of the middle phalanx of the middle finger is then struck with the tip of the middle finger of the right hand. The blow should face perpendicularly. The striking finger is raised

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immediately after the stroke so that the vibrations created by the blow may not be impaired, where a heavy blow is required more than one finger may be used. Percussion should proceed from the resonant to the less resonant direction. The finger in contact should be placed parallel to the edge of the organ and the line of percussion should be at right angles to the edge. The finger contact must always be kept firm, the other fingers being kept out of touch with the surface. Two or three strokes at any one place may be enough for observing the sound produced.

The character of the sound varies in depth and in resonance. The depth depends upon the force of the blow. The sound varies according as the sternum, clavicles, ribs or soft parts underlie the percussion point. The sound produced by the wall is subordinate to that of the organ beneath when this organ contains air and percussion is firm.

When the air in a large cavity is set into vibration, a tympanitic sound is produced. When the cavity is subdivided into numerous compartments with tense parting walls, a characteristic resonance is produced. The pulmonary resonance is low in pitch and clear in character. Long experience only enables physicians to attach certain meanings to the results of percussion. This has to be learnt by practice.

In percussing the lungs their position with regard to the form of apices, the portion over the heart and the borders are aimed at to be determined. Percussion gives also an idea of the condition of lungs in regard

PERCUSSION OF THE LUNGS

to the condition of air in various parts and tension of their elastic frame work. Percussion also enables it to be ascertained as to whether there is fluid or gas intervening between the lungs and the chest wall.

The Apices — These are usually felt by resonance above the level of the clavicles. In disease, one apex may be shorter than the other or both the apices may shrink below normal on account of disease.

The Borders — The lower border of the right lung lies over the liver and is thin. Light percussion may reveal its correct position. On the posterior surface the percussion should be firm on account of the overlying muscles.

After outlining the lungs, the sound over the different parts should be studied. The anterior surface should be examined first and sounds on either sides compared. The axillary regions should be examined next, the patient holding his hands overhead, if he is able to sit up. Lastly the posterior surface should be examined.

In health the resonance has the following character:

The resonance in the apices is clear but not very intense tending to become tympanitic as the trachea is approached. In the mammary region there is difference between the two sides on account of the existence of the heart and liver on left and right. In general the pulmonary resonance is clear and intense except where the other organs interfere.

In diseases the resonance changes. In emphysema the resonance is increased, the pitch is also increased.

EXAMINATION OF THE PATIENT

When the lung tissues are relaxed but contain air, the intervention of septa is almost nullified and the sound is tympanitic. When air has found way into the pleura, the result is intensely tympanitic. Cavities in the lung also cause the percussion sound to be tympanitic. Resonance is diminished when the pleura is thickened or where the lung is consolidated. This may show itself in a whole lobe or in patches. When fluid is present dullness is absolute and there is an unusual sense of resistance felt by the finger in contact. If a portion of the lung gets devoid of air, it produces a peculiar boxy or wooden sound. When a cavity in the lung substance communicates with a bronchus of moderate size and the place is percussed there is a sudden expulsion of air from the cavity and the sound produced is characterised as cracked-pot sound or a hissing sound combined with chinking sound of shaken coins.

Generally speaking, the normal lung resonance is found to be exaggerated in distension of lungs which may occupy areas of superficial dullness of the heart or the liver.

Pulmonary congestion also causes increased resonance of lungs on percussion. There is a relaxation of lung tissue as may occur in the early stage of pneumonia, oedema of lungs and in acute miliary tuberculosis. Resonance is increased also in consolidation of lungs as in extensive lobar pneumonia. Presence of embolus may cause blocking of a branch of artery leading on the one hand to increased

AUSCULTATION OF THE LUNGS

resonance and on the other to dyspnoea, cyanosis, pain in the side etc In case of collapse of a lung through pneumothorax and the collapsed lung having receded from the wall, the space may be filled up with air giving rise to increased resonance on percussion

Resonance gets below normal in consolidation of lungs due to pneumonia and tuberculosis, in thickened pleura, in hypertrophy of the heart etc.

By percussion tuberculosis may be detected even very early The percussion note is diminished.

Auscultation of the Lungs

By auscultation of lungs or the examination of lungs with the help of a stethoscope, several characters of lung sound may be distinguished leading to diagnosis Auscultation is directed towards the determination of character of lung sound from breath sound, from the vocal resonance and from other possible sources of sound

If the patient is capable of sitting up, he should do so For examination of the breath sound which is produced in the larynx, the stethoscope should be applied on the trachea and then on points in travelling down and covering the entire area of the lungs. The sound emitting from the larynx is tubular, the nearer the stethoscope is applied to the epiglottis It begins to be vesicular the more it approaches the alveolar tissues Breath sound is diminished by all such factors which cause to damp it The sound of inspiration lasts

twice as long as that of expiration. Inspiration rustling in character. The expiration follows immediately. The sound resembles that of blowing into a football bladder.

The vesicular breathing is exaggerated in children up to 12 years. If however this is present in adults it may indicate early tuberculosis. In consolidation of the lung, this sound is heard in areas beyond consolidation.

The exaggerated sound may be louder in inspiration and also rougher than normal and during expiration the sound is slightly prolonged due to the loss elasticity of the lung tissue.

If exaggerated vesicular sound is localised in one of the apices of the lungs, it very commonly indicates early tuberculosis of the lungs.

Auscultation of the lungs may detect vesicular breathing of an interrupted character increasing and decreasing in each inspiratory phase. This symptom will indicate the probability of early tuberculosis. This may be due to pain as in pleurisy or due to nervousness.

In another form of exaggerated vesicular breathing the expiration may be prolonged and may be associated with feeble elasticity of the lungs or with narrowness of bronchial tubes due to asthma. This may be a harmless thing also due to habit.

Auscultation may again reveal bronchial type of breathing in which inspiration is high-pitched and blowing and the expiration is exaggerated, both

AUSCULTATION OF LUNGS VOCAL RESONANCE

inspiration and expiration occupying nearly the same time with a gap between Tubular or double 'ch' sound is produced commonly in consolidation as in pneumonia or early tuberculosis or it may be due to condensation in which the lung tissue collapses but remains in contact with the wall of the chest This may also be due to pleural effusion

The sound may be low-pitched, cavernous or double 'haw' sound produced in bigger tubes This will indicate large cavity due to tuberculosis, abscess or gangrene or it may be due to swelling of the lung with large opening in it into a bronchus The sound may have yet another character called amphoric or a mixture of low-pitched and high-pitched tones having a metallic quality like the blowing into the mouth of an empty bottle This will indicate a big cavity or will indicate a pneumothorax or a collapse of a lung

Vocal resonance —Another method of examining the lungs with the help of a stethoscope is to observe the character of the sound when the patient utters a sound such as one-one-one or ninety-nine The intensity and character of the vocal resonance may be compared with the other side of the lungs It slightly varies in intensity on two sides and is generally louder on right side and also near a large bronchus Normally the sound is heard indistinctly because air contained in the lung tissue is a bad conductor But when in case of consolidation of the lung, collapse or cavitation, the alveolar area is

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obliterated and the sound is directly communicated to the bronchus then the resonance is exaggerated. Increase of vocal resonance will indicate the same conditions as are associated with tubular breathing.

On the contrary, the vocal resonance is diminished in cases where the lung area becomes more non-conductor of sound than it normally is. It may happen in pleural effusion and in pneumothorax. It may indicate emphysema also blocking some of the bronchi as in extensive pneumonia.

Adventitious Sounds :—In diseased condition of the lungs two sorts of sounds may be observed which are not present in normal lungs. They are the dry sounds or the rhonchi and the moist sounds or rales or crepitations. The dry sounds are produced by air passing through bronchi which are narrowed in places by inflammatory swelling, spasm or collection of tough mucus.

Sounds are characterised as :—

1. Sonorous rhonchi
2. Sibilant rhonchi
3. Metallic tinkling in pneumothorax
4. Bubbling rales in a cavity
5. Coarse rales in big tubes
6. Fine crepitations in the alveoli

The sound is sibilant or high-pitched and is heard towards the end of inspiration. It is produced in smaller bronchial tubes. The sound is low-pitched or sonorous and is heard during inspiration and is produced

AUSCULTATION OF LUNGS ADVENTITIOUS SOUNDS

in the bigger or medium tubes These sounds are changeable and shifting from place to place When the sounds are diffused they indicate bronchitis But if the sound is localised and persistent, specially in one of the apices, the sound suggests early tuberculosis. Rarely the sound may be due to pressure on the bronchus due to aneurysm etc

The moist sounds may be due to forcible separation of the walls of alveoli Fine rales or crepitations are heard in the first stage of pneumonia The sound is heard commonly at the base It is due to acute congestion The sound resembles the rubbing together of a lock of hair and is present in acute congestion of lobar pneumonia, also in early stages of tuberculosis, particularly if the sound is in the apex It may be due also to the collapse of the lungs and also due to oedema at bases as a part of general anasarca

The crepitations are more pronounced in case of acute bronchitis when the sound is heard at the end of inspiration and at the beginning of expiration Exudation in such cases is more copious and thinner and is in the smaller tubes When the resolution begins in pneumonia such pronounced crepitations may be heard

In chronic bronchitis, in pneumonia in the state of resolution and in tubercular cavity, the sound is very coarse and bubbling This sound may also be heard without the aid of stethoscope In profoundly unconscious patient when the exudation accumulates in the trachea and cannot be coughed out, the sound

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signifies the approach of death and is known as death rattle.

In case of pleurisy the rubbing sound of the two layers of the pleura may be heard either when the lubricating fluid has dried up or when two surfaces have been roughened by fibrinous exudation as in acute pleurisy. This sound may be distinguished from the other sounds in that it is much more superficial and is also more localised. It is thin and frothy in character and is influenced by the pressure of the stethoscope which makes the sound at first intense and then makes it disappear. It is not removed by coughing and is palpable.

Bell Sound :— To obtain this sound a coin is struck sharply by another placed on one part of the affected side, the examiner listening to the sound on some other part of the same side with the help of the stethoscope. A sound like the chiming of bell is heard. This indicates pneumothorax.

Examination of the Pulse

Feeling of the pulse gives valuable information regarding the condition of the heart and also of the system generally. A careful examiner may not only diagnose but also regulate the treatment of many diseases with a fair degree of accuracy. The skill of examining the pulse has to be acquired from a teacher and by continual practice.

The radial artery at the wrist is to be palpated with three fingers. The middle one is used for feeling

EXAMINATION OF THE PULSE

the pulse and the proximate is used for exerting various grades of pressure, the effect of which is felt by the middle one. The distal finger is utilised for stopping by pressure any collateral circulation from the palmar arch.

The feeling of the pulse consists of finding the pressure at which the pressure of the pulse is obliterated. The proximate finger puts more and more pressure till the artery ceases to let the blood wave pass. The same phenomenon is observed as less and less pressure is put and the pulse returns to normal.

The finger also feels the condition of the arterial wall. The pulse rate is also felt here. Normal pulse rate is at birth, 130 to 140 per minute.

Under 1 year ..	about 120 per minute
Under 3 years ..	100 , , "
Under 14 years ..	90 , , "
At puberty ..	80 , , "
Up to 50 years ..	70 , , "
Above 50 years ..	80 or more

The rate is higher in females than in males by about 10 beats per minute. There are variations to these figures shown by healthy persons due to abnormality.

The pulse beats should be regular both as regards force and also time. The beats should be spaced uniformly and the amplitude should also be equal. The feeling of the pulse will indicate the volume, the

EXAMINATION OF THE PATIENT

tension of the pulse also. Volume shows the systolic pressure or maximum work of the heart during the passage of the wave of the pulse. Increase in volume indicates an extra pressure on the arterial wall. If the pressure is high, it may lead to rupture of the arteries at the extremities in case of arterio-sclerosis. A rupture occurring in blood vessels of the brain will cause apoplexy, in vessels of the nose it may cause epistaxis or bleeding of the nose.

Tension is the diastolic or sustained pressure always in the artery. This is the constant load against which the valves of the heart have to work. If this pressure is higher than normal then the heart is forced to work continuously more than normal and is liable to dilatation.

If the heart is made to work against a column of mercury then the height to which the mercury column is lifted, is a measure of the pressure of the blood. This varies at systole and diastole. As by feeling the pressure with finger tips, judgment can be arrived at about the condition of the heart similarly by mechanical appliances the pressure may also be measured in terms of millimetres of mercury. The difference between the systolic and diastolic pressure is called the pulse pressure.

For Indians the pressure is calculated at 90 plus the age for systole and less by 40-50 by diastole. Thus a man of 40 will normally have 90 plus 40 or 130 mm systolic pressure and 130 minus 45 or 85 mm for diastolic pressure.

PHYSICAL EXAMINATION OF THE HEART

Pulse pressure below 25 or about 60 will indicate disease. The systolic pressure is increased in arterio-sclerosis, syphilitic aortitis, nephritis, in excitement, nervousness, physical exercise or asthma.

Certain points about blood pressure — If pneumonia if the blood pressure does not fall below the pulse rate then the case is hopeful.

In rising from recumbent to vertical position, the blood pressure is raised by 5 to 10 mm.

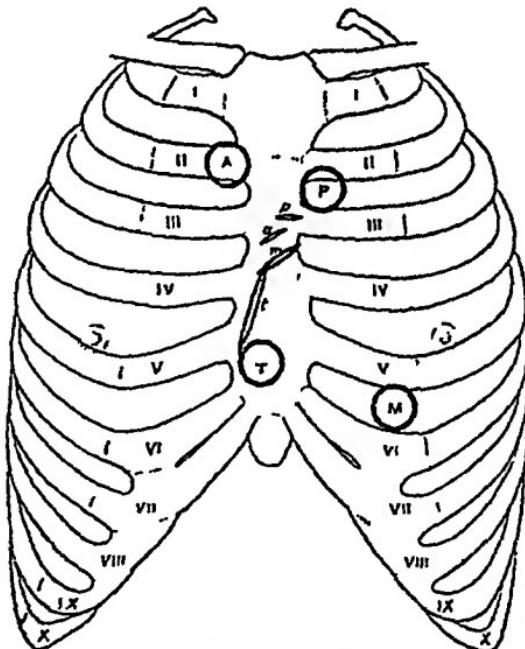


Fig 218 Position of the cardiac valves and places where the different heart sounds are heard best

Physical Examination of the Heart

The topography of the heart is indicated in the

EXAMINATION OF THE PATIENT

p, a, m, t represent the positions of the pulmonary, aortic, mitral and tricuspid valves.

P, A, M, T represent pulmonary, aortic, mitral and tricuspid areas for auscultation.

Inspection and Palpation

The two sides of the chest are symmetrical in health. Want of symmetry indicates abnormality or disease. In hypertrophy of the heart, in dilatation of the ventricles such as mitral regurgitation, if the right ventricle is mainly involved, there is a bulging of the region of the end of the sternum. There may be extra cardiac causes also for example, the bulging out of the chest wall due to pleural effusion, tumour or any deformity in the chest wall.

One side of the chest wall may be depressed from causes outside the heart as for example, in tubercular cavitation or in collapse of the lung after absorption of pleural effusion. The apex beat of the heart is visible in the fifth intercostal space and is about an inch in diameter. It can be made out by palpation with finger tips also where it is not visible in stout persons.

The force of apex beat is increased when the heart is overacting as after physical exertion or emotional changes. The force of apex beat is also abnormally increased in aortic regurgitation and high blood pressure or in pericarditis. The force of the apex beat is diminished and may not be palpable at all if the

EXAMINATION OF THE HEART BY PERCUSSION

apex is displaced under the cover of a rib or if the chest wall is thick or in feeble action of the heart. The weakness of the heart again may be due to degeneration of the heart or for febrile conditions in typhoid, pneumonia, influenza and beri-beri. If the heart is displaced on account of pleural effusion then also there may not be any impact in the normal zone. The normal position is in the left 5th intercostal space $\frac{3}{4}$ inch internal to the mammary line. In children the apex beat is just outside the mammary line in the 4th intercostal space.

Displacement of the apex may be due to heart diseases, hypertrophy or dilatation of the heart.

Examination of the Heart by Percussion

It is possible to obtain much information about the condition of the heart by percussion of the area. For percussion the chest should not be much inflated by the patient as this will interfere with the readings. The fingers and the ears have to be trained to get really valuable data out of this examination.

The middle finger of the left hand should be firmly placed on the surface and percussed with the middle finger of the right hand, the wrist only playing. The elbow should be kept fixed. The right middle finger should be quickly lifted after the stroke, the quicker the lifting, the clearer being the sound.

By percussing, the border line of the heart may be found out. In areas where the lung comes over the

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heart, the stroke should be particularly hard in order to sound the deep dullness. Superficial dullness is found out by light strokes and is the area of absolute dullness. This area is not covered by the lung. Dullness is diminished in normal persons on taking deep breath.

Increase of the area of cardiac dullness will be interpreted according to its location.

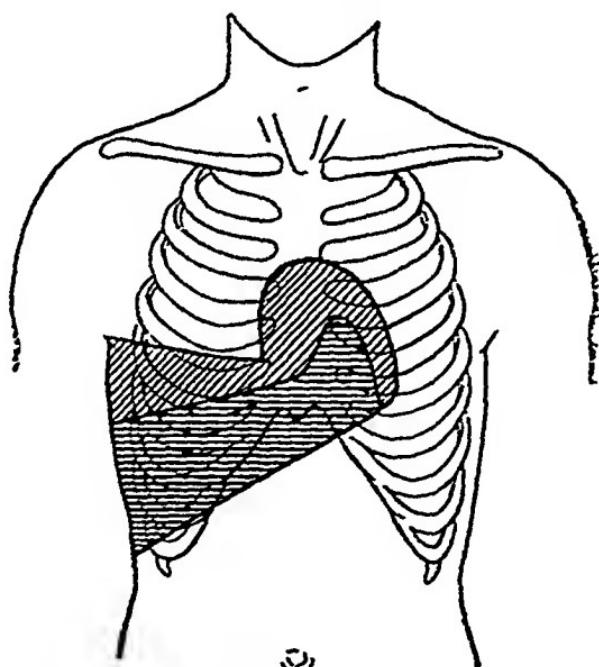


Fig. 219.

Areas of superficial and deep dullness of the heart and the liver.

(1) Outwards to the left and slightly downwards will indicate enlargement of the right and the left ventricles

(2) Mostly downwards and slightly outwards will indicate enlargement of left ventricle.

EXAMINATION OF THE HEART BY AUSCULTATION

(3) Outwards to the left and right and downwards will indicate enlargement of right and left ventricles and also the right auricle

(4) Outwards to the right only will indicate congenital heart disease

Where there is pericardial effusion the area is absolutely dull and sharply demarcated from the lung. In this case the area of dullness changes with the change of position and the pulse is rapid and the veins get distended and the apex beat becomes feeble

Examination of the Heart by Auscultation

Auscultation is best done by means of a binaural stethoscope. In order to get the best results, areas should be marked out which are furthest from the other valves

For mitral examination—Select the apex of the heart
For tricuspid valve—Select the lower end of sternum
For the pulmonary valve—Select the second left intercostal space

For the aortic valve—Select the second right costal cartilage

The normal heart sounds both for intensity and duration should be observed and familiarity with these will enable the detection of abnormal sounds. There are two sounds in each area, the first and the second sounds. The first sound is chiefly from the closing of the mitral or tricuspid valves. The sharpness of the

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sound depends on the valvular and the duration depends on muscular elements.

The duration of the first sound gives indication of the muscular efficiency of the heart.

The second sound is produced by the closing of the aortic and pulmonary valves. This is much shorter and sharper than the first sound. The character of the sound indicates the measure of force of the arterial recoil and of the condition of valves.

The first sound occupies 0.2 second and is followed by a pause of 0.1 second. The second sound is 0.1 second, followed by a long pause of 0.4 second. The total cardiac cycle covers 0.8 second. In normal persons systolic and diastolic sounds may be easily identified. The matter becomes difficult if one of the sounds is absent, shorter or if the rhythm is abnormal or if there are other sounds.

If the heart is dilated then the first sound may be intensified and become short, sharp and distinct. A large volume of blood is thrown against the valves and the thin layer of muscles vibrates more rapidly causing the sharp and distinct character. If however the dilatation advances further, the sound ceases to be distinct and is more or less replaced by a murmur.

High blood pressure or arterio-sclerosis causes the first sound to be accentuated, prolonged and booming, muscular element in the sound predominates.

If the first sound is weak and short then the two sounds are nearly equalised. This may be due to

EXAMINATION OF THE SKIN

degeneration of the heart as in beri-beri or in acute febrile condition as in lobar pneumonia or diphtheria

Raised pressure in pulmonary circulation due to stasis commonly in mitral stenosis and regurgitation intensifies the second sound. The second sound is weakened or absent sometimes in mitral stenosis.

The unusual or adventitious sounds are called murmurs. There are several varieties, each indicating a group of causes.

Examination of the Skin

The general condition of the skin is either soft, elastic and moist or rough and dry. The skin may be loose in emaciation or tense as in obesity. It may be hypersensitive or devoid of sensibility. The skin may show also pigmentations and eruptions in disease.

Eruptions on the skin should be noted for size, appearance, colour, distribution and the mode of extension.

Œdema is quite apparent from examination. The œdematosus surface remains depressed on a pressure being put on it. This is best observed on a surface next to a bone as on the shin. Œdema is associated with circulatory stasis in veins and with capillary pressure. The commonest cause is the decompensated heart. Œdema is most marked in dependent parts and shifts on the change of position. It may be generalised when it is known as general anasarca.

EXAMINATION OF THE PATIENT

Edema generally appears insidiously the first thing being noticed on the ankles, specially marked in the evening. marked with a feeling of tiredness Edema often extends upwards and may involve the whole body and some of the internal organs

The capillaries are dilated all throughout the body. The capillaries between the muscle fibres of the heart are also dilated. The blood pressure is often low. The first sound in mitral area is short and sharp. Sometimes a soft systolic murmur is present. Dyspnoea is often present. The liver is moderately enlarged and urine is sometimes reduced and there is a burning sensation over the body while urine is diminished in quantity.

Eruptions on the skin will need observation on several points :

- (1) Size, appearance, colour, distribution and the mode of extension.
- (2) Feel—shotty or soft and if it disappears on pressure
- (3) Subjective symptoms such as pain, burning, itching, anaesthesia or otherwise
- (4) Constitutional disturbances such as fever, gout, syphilis, gastro-intestinal ailments, focal sepsis and nutritional defects.

The primary lesions are maculae and papulae

Macule is a spot of congestion without any elevation or depression of the surface. It may be generalised and then is known as roseola or it may cover a large area with a fading margin and is then

VARIOUS SKIN ERUPTIONS

known as erythema Macule may be slightly elevated and then known as wheal, a congestion with slight exudation or urticaria which is wheal generalised in different parts of the body

Papule or simple solid elevation of the skin may show itself variously Acne vulgaris They come out as red papules with black points many of which suppurate They may appear on the face, chest, shoulder and back

Prurigo is associated with general itching all over the body Papules with a shotty feel come out in localised areas

Syphilides —These are due to secondary eruptions of syphilis and have certain general characteristics

There are some skin diseases which are papular only at a particular stage of the disease Scabies, eczema, psoriasis, exanthemata belong to this class

Scabies causes papular eruptions and forms burrows The burrows are caused by female acarus which is present at the remote end and may be seen with a hand lens as a small white speck with a black spot These are very itchy The areas involved are folds between fingers, the border of hand, back of elbows, nipples of women, buttocks, genitals, knees, ankles and dorsum of the feet

Eczema comes out as a papule and is changed into vesicle or a small blister In eczema these vesicles burst and leave a raw weeping surface

Psoriasis starts as a tiny papule and scales are subsequently heaped up Exanthemata is the

EXAMINATION OF THE PATIENT

eruption of small pox which changes into vesicle and pustule.

Herpes is a group of vesicles collected along the terminal cutaneous distribution of a sensory nerve, generally the intercostal nerves. Sometimes the facial or the spinal nerves are also involved.

Pigmentation of the Skin

Leucoderma is want of pigmentation in localised area and the surrounding area is hyperpigmented. There is no anaesthesia. It is non-infective.

Melanoderma is increased pigmentation more of blackish or brownish character. This is associated with suprarenal deficiency as in kala-azar, epidemic dropsy, pregnancy, Addison's disease, exophthalmic goitre, sun-burn and prolonged intake of arsenic.

Leprosy

The primary eruptions appear after preliminary symptoms. These are macules with increased or decreased pigmentation. Burning or pricking sensation is present. The skin looks glossy, dry and even cracked. The hairs fall off and sooner or later thickening of the tissues takes place. In the nodular variety the nodules or lepromata appear as infiltration of the subcutaneous tissue with small cells which contain lepra bacilli. The nodules are pink in colour and change to brownish yellow. They become anaesthetic. These coming together increase

LEPROSY SCHEME OF CASE-TAKING

unevenness of the skin and on the face cause the characteristic facial disfigurement or the leonine appearance Fingers and toes ulcerate and drop off. The bridge of the nose is destroyed and the nose is depressed

In the nerve variety the macules are more marked with a pale anæsthetic, non-sweating centre surrounded by redder or hyperæsthetic zone These may be mistaken for ringworm being found most on the covered areas of the body Neuralgic pain and hyperæsthesia aggravate The superficial nerves are involved and thickened In many cases bullæ appear in the limbs which break and eventually heal Anæsthesia, muscular paralysis and trophic changes follow

Points to be Attended to in Case-Taking

Questions

Complaints	.. Nature, duration.
Family history	History regarding father, mother, brothers and sisters. If there is any hereditary diseases.
Personal history	Married or single Habits, exercise, diet, use of intoxicants and their nature General surroundings at home and work
Previous illness	If had any accidents or congenital diseases such as syphilis in childhood or measles,

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small pox, scarlet fever or acute rheumatic fever. If there were any venereal diseases in adult life.

History of present illness

... Time, origin, probable cause course of illness, treatment adopted.

'General Physical Examination'

Age, height, weight, development, muscularity, morbid appearances such as anaemia, jaundice, cyanosis, oedema, and eruptions.

Evidence of past diseases such as syphilis, rickets, small pox, gout etc.

Appearance

. Expression of the face, bearing, attitude, temperature.

Circulatory System

Precordial pain, palpitation, breathlessness, sleeplessness, giddiness. Objective signs such as pallor, cyanosis, pulsation of arteries, pulse. Results of inspection, palpation, percussion and auscultation.

Respiratory System

... Pain, dyspnoea, cough, expectoration. Objective signs as character of voice, breathing rate, rhythm and type,

SCHEME OF CASE-TAKING

painfulness, sputum amount, colour Examination of nose, pharynx, larynx Physical examination of the chest by inspection, palpation, percussion and auscultation

- Alimentary System**
- .. Appetite, thirst, sensations before and after meals, discomfort, pain, distension, nausea, heartburn, acidity, eructations, vomiting, flatulence, state of bowels, colic, tenesmus, diarrhoea and constipation
 - Objective signs such as of Lips Colour, crusts, cracks, ulceration, herpes, pigmentation

Gums Colour, swelling, sponginess, new growth, ulcers

Teeth Pyorrhœa, erosion

Tongue Size, movement, colour, moist or dry, character of papillæ, ulcer, cracks, fissures

Breath Fætor, special odour

- Abdomen**
- .. Wall, distension, retraction, movements with respiration, visible peristalsis Palpation for fluid, gas, tumour, enlargement, movement, hernial orifices By percussion and auscultation

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	for sound of internal movement Foetal heart sound.
Stomach	... Visible peristalsis, tenderness, splashing, inflation, examination by percussion.
Intestine	... Examination of stool, rectal and pelvic examination.
Liver	... Inspection, palpation, percussion, pain, tenderness, jaundice, gall bladder, enlargement, diminution and displacement of the liver.
Urinary System	... Pain in the loins, kidneys, bladder, urethra, frequency of micturition, dysuria, retention, incontinence, suppression, examination of urine.
Glandular System	... Spleen, lymphatic vessels and glands.
Cutaneous System	Condition of the skin, eruptions, pigmentations, emaciation, oedema, obesity.
Locomotor System	... Joints, arthritis, ankylosis.
Nervous System	... Paralysis, pain, heat, sensibility. Special senses : sight, hearing, taste, smell.
Motor functions	... Examination of muscles, their

CHAPTER—XI

DISEASES OF THE DIGESTIVE ORGANS

Introductory

The digestive system begins with the mouth and ends with the anus. This is the entire alimentary tract. This tract is very well built and is capable of resisting much injury and of adapting itself to very varied dietary habits. It is however liable to be out of order by excessive misuse or neglect or by attacks from disease-creating microbes and worms or from infection.

We shall take a general picture of the disease that may affect the digestive system and the general methods of treatment and shall then take up the diseases one by one and deal with them individually.

The disease may take the form of inflammation of organs such as the inflammation of the tongue, tonsils, stomach, duodenum, intestines and peritoneum. Then there may be sores and ulcers in the mouth, stomach, duodenum and in the intestines.

There may be loss of tone in the stomach and in the intestines disabling them to function with vigour. Secretory organs such as the lining of the stomach, the liver and the pancreas may fail to function properly and discharge too much or too little of the gastric juice, the bile and the pancreatic juice.

DISEASES OF THE DIGESTIVE ORGANS

Again disease germs may lodge in the intestine or infection of a specific nature may occur such as in dysentery, cholera and typhoid fever.

When there is inflammation of the tongue giving rise to sores we call it stomatitis. The gums may become inflamed and suppurate, we then call it pyorrhœa ; while inflammation of the tonsils is called tonsillitis. Further down in the canal when there is inflammation in the food-receiving bag or stomach we call it gastritis and when it is in ulcerated condition we call it gastric ulcer and when the ulcer is a little beyond down the track in the duodenum, we call it duodenal ulcer. When the refuse of food materials cannot be passed out by the intestines in proper time and there is delay we call it constipation ; while when food material is thrown out too quickly before digestion we call it diarrhœa and if the stomach and intestines are not functioning for proper digestion we call it dyspepsia. Microbes may attack intestinal canal and cause the particular ailment known as dysentery or infection may induce cholera or bring about typhoid or enteric fever. Due to inflammation or ulceration, symptoms may occur to which we may give different names according to their particular nature. When there is too much pain we call it colic. When there is vomiting from bleeding from ulcerated surfaces in the stomach we call it hæmatemesis and when contents of the stomach or the duodenum are violently thrown out through the mouth it is known as vomiting and these are classed as so many diseases.

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There may be slackening of the muscles of the organs and when it occurs in the stomach we call it dilatation of stomach. The intestine may intertwine or its channel may get otherwise obstructed or strangulated. We then call it intestinal obstruction. Various worms may lodge in the intestines known by different names as tape worm, round worm, thread worm or hook worm and these create various distressing symptoms.

Methods of Treatment of Diseases of Digestive Organs

Enema — In most of the diseases the distress is due to toxic condition of the alimentary canal. Treatment should begin with removal of the toxins and preventing their further formation. The commonest measure is to empty the lower intestine and rectum by washing out by passing water slowly once or more often daily with the help of a douche-can attached to a long tube and nozzle ending in a catheter. The process should be slow the slower, the graver the condition of injury to the intestines.

Massage — The patient should be massaged all over the body exciting the action of the skin. The abdomen should be massaged gently to excite circulation and also to help dislodgment of accumulation. The direction of massaging the abdomen should be along the course of the large intestine. Pressure is to be begun at the right edge of abdomen in the plane

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of the navel. The hand with pressure is to be passed up and across under the ribs and then coursed down the left side turned about towards near the pelvis and complete the round. The massaging should be in this one direction only. For weak patients if a quantity of bland oil is used it will help massaging with pressure and friction and at the same time supply nutrition to the patient. An ounce of oil may be absorbed in this region alone in course of an hour and a half Massaging is to be done gently, patiently and leisurely It cannot be done in a hurry. It is very healthful in many chronic diseases of abdomen In acute condition of inflammation it may not be possible to massage It should be remembered that massage must be comforting to the patient. Massaging should stop when it becomes irksome and uncomfortable for the patient.

Baths :—Sun bath is a common measure for all diseases. It should of course be given Cold bath should be given to patients taking care to avoid exposure. Where the patient can walk about, bathing is the thing, but when the patient is very weak he should not be allowed to move also, if there is inflammatory condition of the intestines Then he should be given a good warm sponging once or more oftener during the day. In all chronic cases rest is highly necessary. Movement aggravates distressing symptoms. The rest however should be a regulated one proportioned to the exercise needed for functioning of the organs

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Medicinal Treatment of Diseases of the Digestive Organs

Chief medicines are —Myrobalan, Calomel, Soda bicarb. Opium, Bismuth, Kurchi and Saline

Points about General Management are :— Clear bowels, make organs aseptic and remove acidity by giving myrobalan, calomel and soda bicarb Allay pains and protect mucous coatings by opium and bismuth Kill germs by kurchi, calomel according to nature of the infection

Calomel in Diseases of the Digestive Organs

Calomel is the medicine in most troubles of the digestive system in as much as it is both an antiseptic and a laxative or purgative according to dose It not only purges the system of the toxins but disinfects and prevents further formation of toxins. It promotes the action of the liver and corrects many ills arising out of sluggish condition of the liver, an organ which plays a very important part in the digestive process Then again calomel soothes irritation in the stomach It may be given in fractional doses of $\frac{1}{4}$ grain every 15 minutes and 4 grains to 6 grains may thus be given in a day in emergencies As it works best in alkaline medium, it should be given with soda bicarbonate

Calomel will contribute towards alleviating distress of tonsillitis. In gastric inflammation and in ulcer it soothes and disinfects In diarrhoea it disinfects

DISEASES OF THE DIGESTIVE ORGANS

and helps removal of offending ingesta and brings about a cure. It stops diarrhoea passing into the stage of cholera. In cholera it works wonders. While it helps expulsion of the toxins, it also kills the toxin-generating organisms. In constipation its laxative action is very effective and in dyspepsia it helps cure by correcting the condition of the liver. In dysentery it acts as an effective disinfectant and in typhoid fever in early stages it not only disinfects but helps the rallying up of the system in many other ways. In colic also it helps cure by removing toxins and ensuring elimination of accumulated faecal matter, if any. In pyorrhœa it helps by removing constipation and bringing normal condition to the digestive tracts and prevents sepsis due to suppuration of the gums.

We may cover the whole range of diseases of the alimentary canal and find calomel a useful remedy of permanent importance. Prolonged use may cause mercurial salivation, aching gums and on the symptoms of salivation appearing, calomel should be stopped for sometime. In the administration of calomel care should be taken to see that it is purged out and therefore wherever possible its administration should be followed by a purgative. The patient should be watched on administration of calomel for any signs of salivation as some persons are more susceptible than others and show a peculiar intolerance to preparations of mercury. If stomatitis appears or the gums bleed or salivation appears, calomel should be stopped and the system purged of it by a proper purgative.

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Soda bicarb in Diseases of the Digestive Organs

Soda bicarb comes in as a very necessary medicine in almost all diseases of the digestive organs. The trouble of this system is accompanied more often than not with acidity or too copious a discharge of the flow of acid gastric juice. In acidity, in colic, in ulcer of the stomach and intestines, an antacid like soda bicarb is extremely valuable. Soda bicarb has a soothing effect on ulcers so that apart from its being an antacid it is helpful in healing inflamed and ulcerated condition of walls of the stomach and intestines. Soda bicarb in 20 grains doses 6 times daily may be administered with beneficent results in combination with calomel in $\frac{1}{2}$ grain doses. It would then be a useful combination for pyorrhœa, dyspepsia, cholera, vomiting, typhoid, ulcers, colic, constipation, diarrhœa, dysentery and most other diseases of the digestive system. This combination may cure many obstinate cases of the diseases enumerated. In fact, in diseases of the digestive system if nothing else is available then a combination of soda bicarb 10 to 20 grains with calomel $\frac{1}{2}$ grain in repeated doses with myrobalans to purge out mercury will cover a very great range indeed.

Bismuth Salicylate in Diseases of the Digestive Organs

Bismuth salicylate dissociates in the stomach into metallic bismuth which gives a soothing and protective coating to the surfaces coming in contact with it. It

DISEASES OF THE DIGESTIVE ORGANS

is useful in all inflammatory, ulcerative and painful conditions of the intestinal tract, in diarrhoea, dysentery and cholera. The salicylate radical in it is antiseptic as also anodyne. In intestinal pains from any cause bismuth salicylate is therefore very effective. It should be given in doses of 5 to 30 grains according to severity of ulceration and pain.

Opium in Diseases of the Digestive Organs

Opium gives immediate relief from pain. In colic, in ulcers of the stomach or duodenum when the pain is severe and is almost intolerable there is nothing like opium. Opium works as a sedative lulling the painful coating to insensibility and this anaesthesia reacts beneficially on the system. It allows nature to recoup by giving a respite. Opium in one grain doses in inflammation, ulcerations and extreme pains or colic and diarrhoea is both effective and beneficent.

Saline in Diseases of Digestive Organs

When the system is drained of its fluid contents to a dangerous extent, the muscles begin to be cramped with a very distressing sensation. In diarrhoea or in cholera one or two motions may throw off so much fluid as may cause cramps to appear. In such diseases therefore, rapid replacement of fluid into blood is necessary. This can be accomplished by subcutaneous infusion of normal saline solution. This solution contains 90 grains of sodium chloride per pint in water.

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at room temperature. In diarrhoea and cholera when collapse is otherwise threatened, nothing acts so efficiently as an intravenous injection of a pint or two of hypertonic saline containing 120 grains of sodium chloride per pint of water. If intravenous infusion is not possible, subcutaneous injection should be given with normal saline. Where patients cannot be fed or given water by the mouth, subcutaneous injection or even rectal injection of normal saline is very effective. In gastric ulcer rectal saline injection helps recovery in more than one way.

Kurchi in Dysentery

Kurchi is a specific in dysentery. Dysentery in any form is amenable to treatment with kurchi in combination with bismuth. Kurchi-bismuth has done wonders in dysentery. In very painful acute cases accompanied with bleeding, emetine injection is necessary, but it has been found that even without an injection of emetine, kurchi-bismuth by the mouth has cured acute and chronic cases of dysentery.

The principal drugs in diseases of the digestive system are calomel and soda bicarb, bismuth and opium, kurchi and saline. With the help of these, any disorder of the digestive system may be fairly tackled.

Diet in Diseases of the Digestive Organs

Regulation of diet often does more than the work of medicine in diseases of the digestive system.

DISEASES OF THE DIGESTIVE ORGANS

Diseased digestive system on the face of it needs rest for recovery. This rest can only be given to it by refusing it food. A false hunger may call for food but it should be a general rule except in case of gastric and duodenal ulcers, to refrain from food. Abstinence from taking any kind of food for one or two days cannot do any harm whereas it may do much positive good particularly in acute stages. But when acute stage passes on to chronic stage, then too it is necessary to give rest to the system by restricting to liquid food and that also having very little food value.

In diarrhoea, dysentery, cholera or typhoid the digestive system is entirely upset and any food given instead of providing nourishment poisons the system. While food should not be given, plenty of water is needed for the purpose of washing out the system. In acute stages of dysentery, diarrhoea, cholera or typhoid not even liquid food should be given even if there is a craving for food. In order to supply requisite quantity of water to the system whey or the fluid left out on separation of fat and casein from milk should be given. Green cocoanut water also is a very good drink. Whey is quite a harmless diet rich in vitamin and will enable patients to withstand a short fast without danger. In fact, in cases of dysentery and typhoid or after recovery from acute choleric stage, one can be kept on whey for days till the system shows ability for digestion of food. Next to whey comes *dahi* beaten up with water.

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Where some liquid food need be given, diluted dahi is the best. It is easily digestible and helps culturing of curative bacteria in the intestines. Where the liver has gone wrong it is difficult for fat to be digested. In such cases, as of persons passing whitish stools indicating lack of bile, dahi devoid of fat or butter milk would be an appropriate diet.

By confining patients to whey water or butter milk only, recovery is hastened and the stomach becomes able to function properly early, although a long time must elapse before solid food may be given. In cases where the intestinal walls have been thinned down to the point of being punctured, as may happen in cholera, dysentery and typhoid, a too early admission of solid food may perforate the intestines with fatal results.

Green cocoanut water is not only a soothing drink but has a good deal of sustaining property in it. It is rich in vitamin and can enable one to withstand fasting or semi-starvation as falls to lot of patients in cases of serious digestive disturbances. It contains also some valuable mineral salts to its credit.

Fruit juice is also a harmless but invigorating food. Cheap seasonal juice of fruits may be taken the juice expressed and strained through cloth for administration. Juice of oranges, lemons, limes sweetened tamarind water, juice of pine apples or pomegranates may be given watchfully. It is to be seen first how the patient tolerates a particular fruit juice.

DISEASES OF THE DIGESTIVE ORGANS

Stomatitis

Sores in the mouth or inflammation of mucous membrane of the mouth is a common disease. There are several forms of stomatitis although the treatment is the same. In aphthæ (thrush) small white spots appear on the mucous membrane of the mouth. The spots are surrounded by a red border. These white spots are afterwards thrown off exposing raw surface. They occur on the tip, sides and the fore part of the tongue and also on the inner surface of lips. Sometimes two or three of these small lentil-like sores run together forming an irregular patch.

There is a mild recurrent form of this which is apt to run in families. In another form of inflammation of the mouth, the tongue is covered with thick fur and there are tenderness and swelling of the mucous membrane, affecting the cheek and gums. This is frequently accompanied with fever.

This disease is very often connected with constipation or disorder of the stomach. A purgative say of myrobalans should be given. Purgation is a definite necessity in all cases of stomatitis whatever be the cause. The mouth should be cleaned with a lotion of borax and thymol. Local treatment consists of cleaning the tongue and mouth first and then washing with a very dilute solution of copper sulphate. The sores may also be touched with a stronger solution of copper sulphate (10 grains to the ounce), remembering at the same time that it is a corrosive substance and may injure the delicate membrane.

STOMATITIS

The sores heal rapidly. Immediate relief is also obtained by applying borax-honey paint. The sores may be painted before and after meals thrice daily. Attention to the bowels is the foremost necessity. Often a single dose of purgative will heal the sores in one day. Where the sores are habitual and run as family traits, regular use of myrobalan is of the utmost use. A single myrobalan fruit chewed and swallowed at bed time serves double purpose. The tannin of the myrobalan hardens the mucous membrane of the mouth and its effect continues over night leaving the sores better. Myrobalan again serves as a laxative and thereby helps to remove the cause of sores. Children may get stomatitis even when they are in sucking period through want of proper cleansing of the mouth, nipples and feeding utensils.

Prescriptions

Myrobalans internally—1 fruit or 3 tablets of 20 grains each powdered and mixed with water at bed time to be given as a laxative. For purging 3 to 4 fruits or 8 to 10 tablets made into paste with water and diluted. To be taken at bed time.

Borax 3 grains

Thymol $\frac{1}{2}$ "

Soda bicarb 5 "

Corresponding to one tablet of boro thymol alkali. Dissolve in two ounces of water. Gargle

DISEASES OF THE DIGESTIVE ORGANS

Borax 5 grains

Burn borax over open fire or heat strongly on a plate till it becomes spongy by dehydration. Make into a thick paste with a few drops of honey. Apply on the sores with a swab or rub over them with fingers. This preparation is very useful in stomatitis of children. As stomatitis is often associated with pyorrhœa, potass permanganate solution (1 in 1000 or over 7 grains to the pound) is very useful. It kills the pus-forming bacteria from the roots of teeth also cleanses the sores of stomatitis.

Alum solution should be used as a gargle in cases associated with spongy gums.

Fractional doses of calomel gr. 1/8 to gr. 1/12 with soda bicarb gr. 2 act like a specific in digestive disorders due to stomatitis.

Pyorrhœa Alveolaris

This disease is an infective condition of the sockets of teeth. The infection manifests itself in formation of pus in the socket which forces itself up round the teeth. The gum becomes tender and on pressing pus oozes out along the margin of teeth. Ordinarily the mouth is a suitable place for harbouring bacteria. If by any chance there is formation of pus anywhere in the mouth then various types of disease-forming bacteria find lodgment and multiply. In pyorrhœa the seat of pus being at the root of the teeth is here protected by gums and therefore bacteria can grow undisturbed. The mouth then becomes a manufactory for diseases.

PYORRHœA ALVEOLARIS

Pus from the cavities continually finds its way into the stomach. When mixed with food the acid discharges of the stomach may help to kill these bacteria but it may not be so always. Even before entering the stomach bacteria lodged in pus cause trouble with the tonsils and pharynx. Some think that a majority of human ailments have their source in bacteria from foul tooth cavities. When the disease is far advanced, the gums become swollen and the stomach being dosed with increasing quantities of pus refuses to function properly. Sepsis in various forms appear, digestion goes wrong, liver troubles set in and the whole system becomes rotten resulting in death. The most important thing about pyorrhœa is its prevention. It has to be prevented by attending to the hygiene of the mouth. Food particles should be removed from interstices of teeth after every meal. This should be done by repeated gargling. Tooth-picks should be avoided. Constipation is very often a fruitful source of insanitary condition of the mouth leading to trouble with teeth and consequent pyorrhœa. Onset of pyorrhœa is indicated by the presence of foul smell in the mouth after sleep or at every interval of 2 or 3 hours after an wash. Care should be taken at this stage.

In all cases after pyorrhœa has developed, the patient should keep his bowels clean, if necessary by a daily dose of 2 to 3 fruits of myrobalans. Most of the troubles may then cease. If the offending teeth become very loose, they should be extracted and the exposed cavity healed by the use of astringents. The

DISEASES OF THE DIGESTIVE ORGANS

mouth may be washed with a solution of garlic juice. Boro thymol mouth wash is another antiseptic. Local application of creosote may also help to give some relief. Painting the gums with tinct. iodine is helpful. But none of these measures are likely to cure the disease or make the cavity of the mouth harmless.

Rubbing the gums gently with finger causes circulation and is helpful. Similarly raw and tender twigs of *neem* or *babul* may be used with advantage. The bark of the twig is a very good astringent and soft brush made of the end of the twig is a good cleaner and serves to massage very effectively the gums. Where constipation or dyspepsia is chronic and mere laxatives do not work much, the use of douche daily as enema is recommended. General health should be improved and the offending teeth removed. Use of sun bath and exposing the gums and the cavity of mouth to sun are recommended. Massage of the whole body will help circulation and improve general health. The dietary habits of the patient should be enquired into and if any deficiency of vitamins be discovered, it should be made up. Leafy vegetables or green juice of edible leaves where the digestive capacity is poor, should be given. Deficiency of vitamins A and B should be made up by liberal use of milk and whole unpolished rice or *ata*. If the liver is affected, calomel should be given, great care being taken to avoid mercurial salivation. In every case of use of calomel in pyorrhoea, it should be followed up with a saline purgative of magnesium

DISEASES OF THE DIGESTIVE ORGANS

Iodine—Injection is to be given in 1 c.c dose once a week in severer cases.

Bismuth salicylate—2 c.c. to be intramuscularly injected If there is a taint of syphilis, this treatment gives wonderful results

Calomel— $\frac{1}{4}$ grain

Soda bicarb—4 grains

Eight doses to be taken daily in short intervals for asepsis also as laxative It is to be stopped when signs of salivation appears.

Emetine hydrochlor—1 c.c. ampoule.

A course of emetine injection may be of great service which may act by way of improving the liver, alternately with injection of bismuth salicylate—2 c.c or singly.

Prescriptions on stomatitis apply to pyorrhœa also. Alum and potass permanganate are useful as indicated under stomatitis.

Nux vomica powder—2 grains

Soda bicarb—10 grains or 1 tablet nux vomica for one dose Thrice daily if there is any intestinal trouble.

Tonsillitis and Pharyngitis

In mild form of tonsillitis the mucous membrane is inflamed. The tonsils also may be inflamed and cause evudation. In more distressing cases abscess is formed on the tissues beside the tonsils and they are called peritonsillar abscess. Tonsils are glands Though important glands yet they are susceptible to

TONSILLITIS AND PHARYNGITIS

disease They are easily affected by infection They get often inflamed and inflammation often gets on to a chronic stage They may get so enlarged as to cause obstruction to respiration and deglutition Diseases of tonsils make the system more prone to diseases, low fever, general ill health are some of its manifestations They may affect ears They may foster tuberculosis, pleurisy, diphtheria etc Deficiency of vitamins A and D predispose persons to attacks of tonsillitis and pharyngitis Families have been found where all members suffer and the cause could be traced to deficiency of vitamins in food

Some persons are constitutionally predisposed and have a peculiar susceptibility to acute attacks of tonsillitis Attacks of rheumatism have been observed to be preceded by attacks of acute tonsillitis It may be that the poison of rheumatic fever gains entrance into the body through the tonsils Not only rheumatism but various attacks of infectious diseases are believed to have their origin to disease-creating microbes which gain entrance through inflamed or suppurating tonsils

Fever is usually present and sometimes the temperature may rise up to 104° or 105° F The pain often extends to the ear There is difficulty in swallowing The patient complains of soreness of the throat and on examining, it will be found that one or both the tonsils are swollen, red and projecting into the pharynx The surrounding region and the uvula also share the inflammation If there is abscess

DISEASES OF THE DIGESTIVE ORGANS

then towards the end complaints of throbbing pain and great tension in the inflamed part indicate that pus has formed. The abscess bursts suddenly and its contents are swallowed or discharged through the mouth. Immediate relief follows this termination.

In pharyngitis there is an inflammation of the mucous membrane of the pharynx, soft palate and tonsils. In severe cases there is swelling and great relaxation of the membrane which is covered with a secretion. The uvula gets swollen and elongated. Sometimes pus is formed. Pharyngitis is commonly known as sore throat. In chronic pharyngitis the area becomes granulated. There are hoarseness and dryness in the throat and usually some fever which may sometimes rise up to 104° F. In some cases there is complaint of pain or aching in the back and limbs. The glands about the throat are occasionally swollen.

In both tonsillitis and pharyngitis, the danger of further infection through the infected membrane of tonsils or pharynx is the same. Both are generally caused by cold or damp or inhalation of dust or irritating gas and the treatment is the same.

Try to keep down the temperature by cold sponging or bath. Give as little food as possible and that in liquid form only.

Expose the cavity of the mouth to sun and also take sun bath. Massage with oil rubbed in while taking sun bath is an effective measure for giving general tone to the system. For aperient action use myrobalan

TONSILLITIS AND PHARYNGITIS

and for purgative action use myrobalan in larger doses

Where action of the liver is desired give calomel in fractional doses Liquid food containing vitamins A and D such as milk, butter, ghee, tomato juice etc should be given

Prescriptions

Move bowels with the help of an aperient Myrobalan 20 grains, 3 tablets in one dose daily Where there is a tendency to constiveness, use myrobalan as a purgative giving 9 tablets per dose or 3 fruits at bed time

For purgative where the liver is sluggish, use calomel in 1 grain dose, 1 tablet at bed time followed by a saline purgative Magnesium sulphate in $\frac{1}{2}$ oz dose next morning

For local application use boro thymol alkali 10 tablets in 20 ounces of water as a gargle Gailic 8 grains or 1 tablet in an ounce of water is a good thing for gargling It soothes and disinfects at the same time For paint use iodine 3 minimis in half a drachm of honey, thinned to the requirement of a paint for application with swab Alternate iodine application with a gargle of alum For relaxation of the membranes a gargle of cutch in water (1 dram in 8 ounces of water) is useful

For fever cinchona in $2\frac{1}{2}$ grains dose with soda salicylas 5 grains or 2 tablets thrice daily It relieves pain felt at the back or all over the body If due to

DISEASES OF THE DIGESTIVE ORGANS

cold use tepid the boro thymol lotion for washing the nose by drawing a quantity of it through the nose and wash out through the mouth.

Gastric Catarrh or Gastritis

There is a sense of fullness and uneasiness in the stomach with flatulent distension and tenderness in gastritis. The tongue is coated, breath is foul and there is a bad taste in the mouth. There are thirst-loss of appetite, increased flow of saliva, nausea, heart-burn with eructations of sour, acrid foetid gas resulting from the decomposition of food in the stomach. Sometimes there is constipation, on other occasions when the catarrh of mucous membranes descends into the small intestine there are diarrhoea and tenderness in the abdomen. Urine is scanty and of deep colour. There is a general feeling of uneasiness and bodily and mental depression, headache and coldness of extremities. These symptoms may be due to the absorption of poisonous substances generated in the alimentary canal.

In chronic cases the patient complains of loss of appetite, epigastric pain and sour eructations. There is usually a morning vomit of watery fluid mixed with mucus. It is chiefly saliva swallowed during night mixed with gastric mucus. Often there is constipation but occasionally there is diarrhoea due to intestinal catarrh. The mouth is foul, tongue is dirty and flabby and indented by teeth marks at edges. Dullness and lassitude are great. Temper is irritated

GASTRIC CATARRH OR GASTRITIS

and there is frequent headache with occasional attacks of vertigo

If there is any irritant poison in the stomach it should be vomited out

The stomach should be given rest as far as possible Only fluid, unirritating diet should be given. Morbid decomposing matter should be prevented from accumulating in the intestines by an enema Where there is excessive acidity it should be corrected

Diet during convalescence and after should be regulated. Defect in habitual food should be gone into and corrected where necessary Over-feeding should be avoided

In disease like this, natural methods of cure are perhaps the only methods, medicines may be only helpful adjuncts

In order to empty the stomach in cases of acute distressing condition, plenty of salt water should be given Massage on the stomach helps emptying of the stomach Where there is extreme pain calling for immediate relief, opium by mouth in 1 grain dose may be given, but one should be careful with opium as some persons are very sensitive to this drug

Diet should be so regulated as to give practically rest to the stomach Whey water left after extraction of fat and casein from milk by precipitating them with lemon juice or papaya juice, is a good starvation diet containing milk sugar and mineral substances along with vitamins

DISEASES OF THE DIGESTIVE ORGANS

Cocoanut water is another excellent drink, it gives the stomach the necessary rest and provides vitamins. The stomach will be greatly helped in coming back to normal condition if nothing except water is given during the first 24 hours. Removal of the cause of gastritis should proceed along with attempts at dietetic therapy. The cause may be direct such as excessive smoking, or excessive use of alcohol. Correction of errors in eating is a great factor. Eating hastily with insufficient mastication induces gastritis and should therefore be avoided.

In chronic gastritis attention should be given to the condition of teeth and the mouth and faults there should be located and treated. In chronic cases the flow of gastric juice may be meagre, then giving such food as requires prolonged vigorous mastication will be beneficial as this will induce greater flow of gastric juice. In acute cases however, rice gruel is a good diet.

If there is diarrhoea then want of acidity is indicated. In such case juice of lemons with diet or water should be given. Tamarind may also be given for the same object.

Pepper and all spices should, as a rule, be avoided during treatment and afterwards.

Prescriptions :

Calomel in $\frac{1}{2}$ grain dose with soda bicarb 10 grains 4 times at intervals of $\frac{1}{2}$ hour should be given for sometimes to prevent formation of toxins. Mild

GASTRIC AND DUODENAL ULCERS

aperient like myrobalan one fruit or 3 tablets increasing if necessary to 3 fruits or 9 tablets should be given It is best to depend upon washing out of the lower intestine by mild douching For acidity soda bicarb in 20 grains dose 3 or 4 times a day should be given To prevent sepsis antiseptics should be given such as creosote in one minim dose thrice daily or one tablet creosote thrice daily Garlic and thymol may be usefully employed for the same purpose When there is hyperacidity in gastritis then it becomes difficult to distinguish it from gastric ulcer and the treatment is then the same as that of gastric ulcer In acute distress opium in 1 to 2 grains doses is to be given followed by enema

Gastric and Duodenal Ulcers

Ulcers, whether of the stomach or duodenum, have similar character, their effects upon the system are the same and their treatment is the same They are therefore treated together

It is difficult to say how these ulcers originate The theory that they are caused by drinking excessively hot fluids may be dismissed as persons not taking hot drinks are apt to have these ulcers Some think that these are caused by bacterial infection and the source may be looked in the mouth from affected tonsils or from pus generated under the teeth in pyorrhœa The effect of such lodgment of bacteria on the mucous membrane of the stomach and duodenum is slackening of circulation With

DISEASES OF THE DIGESTIVE ORGANS

diminished circulation the patches on the walls of stomach or duodenum are easily eaten away by the corrosive action of the gastric juice. It is a wonder how the stomach bears the continued attack of hydrochloric acid which is generated every time there is a call of hunger or every time food is deposited. It is only the active circulation of blood that can keep the mucous membrane intact. Whenever the circulation is impaired in spots or patches, the corrosive action of the acid juice is felt, the mucous membrane is eaten away leaving fresh ulcerated surface exposed to the acid action of gastric juice. Sometimes the disease indicates its presence by copious discharge of blood. Occasionally it will give rise to disorders of the digestive organs such as dyspepsia. But as a rule, the disease when chronic produces characteristic symptoms. A pain like that of true hunger-pain is felt, a burning, piercing or boring sensation is felt which comes at the same hour after meals, sometimes several hours later. There may be acidity and occasionally blood may be present in the stool indicating ulceration. The symptoms persist through weeks, months and years. There may be occasional periods of remission but then again they reappear giving a short periodicity to its course. Other diseases of the digestive organs may simulate ulcer and on the contrary, the ulceration may cause other diseases.

Persons habituated to drinking alcoholic liquors ruin the lining of their stomach and consequently suffer from gastritis and acute gastric ulcer.

(ASTRIC AND DUODENAL ULCERS DIETETIC CURE

Ulceration induces excessive secretion of acid juices and the treatment consists of neutralising the acidity and of protecting the exposed surfaces of the ulcers from the abrasive action of food and the very acid secretions of the juices. The excruciating pain felt after eating in some, causes them to dread food. They prefer starving or taking too little food. But this only aggravates as the pain comes on all the same with greater distress when the stomach is kept empty. In fact the distress is so acute that injection of morphine in small doses often fails to relieve.

The treatment lies in administering alkali in the shape of soda bicarb and bismuth carbonate in rather large doses after meals. The carbonate neutralises the acid and bismuth gives a protective coating to the ulcerated surface.

Dietetic Cure —The greatest thing is to protect the ulcers by taking liquid food at intervals of one hour or so. If there is some food constantly in the stomach and duodenum then the acid secretions react on the food only and the ulcerated surfaces are protected from their corrosive action which happens as soon as food is pushed out of the stomach or duodenum. Feeding the patient at close intervals with soothing fluid or creamy food has charming effect. The pain diminishes and in a few weeks disappears. After feeding every time the patient should be dosed with soda bicarb singly or together with bismuth carbonate 3 ounces of dahi every hour for 12 hours or 36 ounces per day should

DISEASES OF THE DIGESTIVE ORGANS

be given. Where so much dahi is not procurable due to poverty or not tolerated, rice or sago made into gruel with some milk or dahi should be given sweetened to taste. Where feeding every hour is not possible then whatever nearest is possible should be done. Feeding at interval of 2 or 3 hours with liquid food or gruel with doses of soda bicarbonate in between the meals is also found to be satisfactory in many cases. 120 grains of soda bicarbonate and bismuth salt 15 to 30 grains in several doses may be given during the day. Bismuth may be dispensed with after a few days, but soda bicarbonate should be continued. Many sufferers upon whom all attempts at relief have proved useless and upon whom even injection of morphine had little effect, have been relieved of the excruciating pain within a week's course of above treatment.

This feeding cure was proposed by Sippy in 1915, which he had then used for more than 12 years with results far beyond expectation. This treatment has been named after him as Sippy treatment. It has been the source of relief to thousands of sufferers.

Isafgul may be given as food and emollient for ulcers. Attention should be given to the condition of the mouth. If there is tonsillitis, then it should be attended to. If there is pyorrhœa then the affected teeth should be extracted and treatment as for tonsillitis or pyorrhœa carried on along with the feeding and alkali treatment.

SIPPY TREATMENT IN DUODENAL ULCER

In addition to regulated feeding and treatment with soda bicarbonate the bowels should be attended to. The bowels should be washed down slowly with the help of douche every day. Where this is not possible, small doses of castor oil in form of emulsion say 2 to 3 drams daily should be given. Magnesium sulphate may alternatively be given as an aperient. The ulcers generate toxins and therefore calomel in $\frac{1}{2}$ grain doses 4 times a day followed by an aperient is of great value in bringing back normal condition.

Where there is intolerable pain, it would be advisable to inject morphine hydrochlor $\frac{1}{4}$ to $\frac{3}{8}$ grain or give a small dose of opium by mouth.

General health of the patient should be improved. If there is vitamin deficiency, it should be attempted to be met as suggested in the chapter on Nutrition. Sun bath, massage with oil when exposed to sun and daily baths of water are very necessary adjuncts to healing. Where it is possible for the patient to take rest, it should be taken. If however on account of poverty or other reasons work must be done, then those involving heavy exercise should be avoided. The stomach should be given mechanical rest.

After recovery, care should be taken not to misuse the stomach by taking unsuitable or irritating food or by over-feeding.

Prescriptions

Soda bicarb 10 grains

Bismuth carbonate 10 grains

DISEASES OF THE DIGESTIVE ORGANS

One dose after every meal 8 times a day or two doses at a time if only 4 or 5 times are given a day

Calomel $\frac{1}{4}$ grain

Soda bicarb 5 grains

Four tablets daily for laxative and antiseptic action followed by an aperient.

Opium—1 to 2 grains. Given by mouth for relieving intense pain or injection of morphine hydrochlor $\frac{1}{4}$ gr in 1 c.c.

Papaya milk—5 minims or 1 tablet.

To be given when there is digestive trouble.

Castor oil—In 1 or 2 drams doses in the form of emulsion to be given to remove constipation.

Diet to be given every hour or two in small quantities

Dilatation of the Stomach

Dilatation of the stomach is due to stricture or obstruction at the pylorus or by any cause which weakens the muscular tone of the stomach and makes it unable to discharge its contents either promptly or fully. Such a condition may be brought on by gastritis or by gross abuse in eating by overloading or by excessive use of alcohol or by general debility. Whether it is functional or mechanical the result is the same. Food which should have passed down to the intestines remains longer in the stomach, causes fermentation and foulness and generally poisons the

DILATATION OF THE STOMACH

system The evil effect of this appears through various symptoms

Generally the symptoms of acute dyspepsia appear. There is vomiting of more or less severity. There is a feeling of thirst. Pulse is quick and small. There may be some degree of collapse and severe pain in the stomach. There is a sense of fullness in the stomach which is aggravated by taking food. Sometimes there is constant pain or putrid gases form. Often there is vomiting in which contents are thrown out in a gush. Examination discloses the presence of food taken days or weeks ago. This is a sure indication of dilatation, differentiating from other digestive diseases. There is loss of appetite and sometimes there is morbid hunger. The stomach, on lying down, pushes against the diaphragm causing difficulty in breathing. Quantity of water is diminished in the system and sometimes there is deficiency of water in blood causing cramps. The flaccid and almost inert stomach with its ineffectual attempts at contraction loses its shape and widens out at the bottom. This is characteristic of the dilated stomach.

In this case, where the disease may have different origins, treatment should be directed to the patient as a whole rather than to his stomach only. Effort should be made to determine the cause of the atony and then to correct it. At times no satisfactory cause may be found and it must be attributed to constitutional debility. A general up building treatment, rest and nourishment is necessary in milder cases.

DISEASES OF THE DIGESTIVE ORGANS

Lavage or washing of the stomach gives great relief and is a good thing, particularly in more advanced and chronic cases.

Acute cases with their distressing symptoms need no dietary regulation, simply no food should be permitted. Gastric lavage should be given immediately for relief.

In chronic cases, where there is acidity soda bicarbonate and bismuth carbonate should be given. Garlic and thymol as antiseptics are good. In cases of great distress which persists even after lavage, opium in 1 grain dose should be given. For toning up the muscles of the stomach, nux vomica should be given. Generally treatment and dietary regulation should be the same as in the case of gastric ulcer. Sippy treatment is quite good, only as little food as possible should be given. Bowels should be kept clean with the help of enema and aperients.

Massage should be given to all the limbs and particularly the stomach should be carefully but persistently massaged. Sun and water bath should be depended upon for improving general health. Where the patient is able, light exercise should be recommended. Vitamin deficiency if any, should be enquired into and met. In treating it should never be forgotten that it is the accumulated food matter rotting in the stomach that causes the poisoning. Food material should not be allowed to remain lodged in the stomach. Liquid food such as milk and dahi or gruel is helpful in complete emptying of the stomach.

CANCER OF THE STOMACH

A free flow of urine is desirable and when urine is scanty, punarnava should be given. For constipation myrobalans or castor oil should be given. A daily douche is recommended till constipation disappears.

Prescriptions :

Myrobalan—1 to 3 fruits should be given in paste mixed with water at bed time as a laxative or purgative.

Calomel— $\frac{1}{4}$ grain

Soda bicarb—10 grains

One dose 4 such in a day. Should be given for antiseptic action and also for keeping bowels moved.

Bismuth carbonate 10 grains

Soda bicarb 10 „

One dose—3 to 6 such doses should be given daily according to nature of acidity.

Nux vomica—2 grains

One dose Thrice daily for toning up the muscles of the stomach.

Opium—1 to 2 grains

One dose should be given to alleviate extreme pain.

Cancer of the Stomach

Cancer is a bad disease and is regarded almost as incurable. Cancer affects the stomach as much or more than any other organs. From the stomach it may affect the liver and the other organs. By proper attention to general health and appropriate treatment

DISEASES OF THE DIGESTIVE ORGANS

rapidity of its course may be modified and comfort may be given to the patient.

Its causes have not been definitely known. It is found that it rarely attacks persons below 30 years. Most common age being between 30 and 45. It spreads round about a nucleus, killing tissues. This brings about the suffering and ultimate death of the victim.

It is difficult to diagnose the cancer of the stomach for it resembles very often chronic gastritis and in case of bleeding it resembles chronic gastric ulcer and haematemesis. Loss of appetite, pain after taking food, flatulence, dyspepsia, sour eructations, constipation, progressive emaciation, anaemia, vomiting of blood and bloody stools are the symptoms.

The treatment should be according to symptoms and should follow the lines indicated in gastric ulcer. General health should be improved. The symptoms of distress will indicate which treatment is to be emphasised. The five general lines of natural treatment should be given due attention to namely, 1. sun bath, 2. massage, particularly of the affected area and generally of the whole body, 3. water bath in cold water or with warm water at body temperature, 4. keeping the bowels clean with the help of douche in cases of constipation and diarrhoea and thereby freeing bowels from toxins and 5. drinking plenty of water to flush the system.

For imparting resisting capacity to blood intravenous injection of iodine is helpful. A surgeon should be consulted where possible.

HÆMATEMESIS

Hæmatemesis

Hæmatemesis is vomiting of dark-coloured blood from the stomach. It is a symptom and not a disease. Blood vomiting may occur on account of disease of the stomach, liver and spleen. One has to be sure where the blood comes from in order to be able properly to deal with it. It must be distinguished from hæmoptysis or coughing up of bright red blood from the lungs.

In hæmoptysis or bleeding from the lungs blood of bright red colour of a frothy character being mixed with air and saliva is thrown out in mouthfuls. There are pain in the chest and difficulty of breathing. Cough and bronchial symptoms are present and no blood is passed with stools. While in hæmatemesis or bleeding from the stomach dark-coloured blood mixed with food is profusely vomited out with pain and tenderness at the pit of stomach. Blood is often passed with stool and there is no cough or bronchial symptoms. Blood flowing into the stomach is reacted upon by gastric juice and becomes black. When it has accumulated it brings about nausea and vomiting which helps the throwing out of it. Portions pass down into the intestines and are discharged as black clots or otherwise with stool (melæna).

Hæmorrhage into the stomach may occur from rupture of blood vessel. It may be due to permeability of the walls of blood vessels or it may be due to a diseased condition of the liver on account of which a portion of blood without passing wholly through the

DISEASES OF THE DIGESTIVE ORGANS

liver makes a backward-flow through the portal vein towards the stomach. In cancer and in ulcer, blood vessels may be eroded. Erosion may also occur through contact with corrosive substances. Vessels may get ruptured through blow or other mechanical injury. Violent acts of vomiting may cause haemorrhage.

In a few females, occurrence of menstrual irregularities exert an influence on the occurrence of gastric haemorrhage at regular interval.

In haemorrhage in the stomach there is usually vomiting of blood but some symptoms precede vomiting such as a sense of weight or fullness accompanied by nausea. If sufficient bleeding occurs, the patient becomes pale, complains of giddiness, faintness, noises in the ears and sparks of light in the eyes. The pulse becomes rapid and the skin cold. If there is too much loss, fainting follows. But the alarming symptoms soon pass away and the patient recovers. In certain cases this letting out of blood relieves the aggravating symptoms of liver ailments. Blood pressure has to be diminished in cases of bleeding but fortunately the very act of bleeding does it. It is now recognised as an axiom that haemorrhage tends to cure itself.

The patient should be given absolute rest and no food should be given for sometime for there is the danger of food material causing irritation and thereby reopening the veins to bleed. In severe cases opium 1 to 2 grains internally or a hypodermic injection

TREATMENT OF HÆMATEMESIS

of morphine hydrochlor gr $\frac{1}{8}$ to $\frac{1}{4}$ in 1 c c should be given Cold should be applied A few folds of cloth may be placed on the stomach and kept constantly soaked allowing the overflow of water to drain away without wetting the patient's bed Ice should be applied where available Cold mud plaster is effective In case of fainting, some blood may be made to artificially flow into the brain by keeping the head low and raising the feet of the bed

There may be much loss of blood causing a fall of blood pressure and inconvenient decrease of circulating fluid In such case subcutaneous saline injection should be given But the introduction should be very slow otherwise the coagulum which stopped haemorrhage may be washed off by higher pressure of blood For this reason intravenous injection is not suitable

To stop bleeding astringents like alum and turpentine may be given internally But with astringents there is this difficulty that they may induce constipation which will react and raise blood pressure Calomel in $\frac{1}{2}$ grain dose should be given 4 times daily both as aperient and antiseptic For soothing action isafgul may be given For controlling tendency to vomit, iodine in one minum doses may be given Calcium carbonate or chalk may be given internally which becomes calcium chloride in the stomach and increases the coagulable property of blood Calcium lactate 15 grains doses 3 or 4 times a day is preferable to calcium chloride orally

DISEASES OF THE DIGESTIVE ORGANS

For combating constipation myrobalan should be given which should be rendered into smooth paste by rubbing in a mortar. Nothing gritty should be allowed to enter the stomach

Sunbath, massage and cold bath should be given Whey with plenty of water should be given If the drinking of water induces vomiting then the quantity of water may be reduced but the minimum of 3 lbs of water per day should be given If feeding by mouth is difficult then rectal feeding should be attempted

Prescriptions :

Calcium lactate 15 grains or 3 tablets per dose 3 or 4 times daily

Opium—1 to 2 grains internally or morphine hydrochlor $\frac{1}{8}$ to $\frac{1}{4}$ grain hypodermically

In case of intense pain, opium preferably in form of injection should be given

Calomel— $\frac{1}{4}$ grain

Soda bicarb—10 grains

1 dose 4 such for antiseptic and aperient action

Iodine—1 to 2 minimis In an ounce of water 3 or 4 times to stop vomiting

Myrobalans—3 fruits at bed time.

Vomiting

Vomiting is a common symptom to most of the diseases of the stomach but it occurs also in a number of other diseases such as cholera, whooping cough,

VOMITING

phthisis, uterine diseases, tumour, hysteria, fever etc. But at times vomiting occurs by itself as a disease for example, in sea-sickness.

Vomiting, if due to irritation, may be prevented by removing the cause of irritation. Sometimes too much flow of gastric juice in the stomach makes the food overacid and the discharge end of the stomach refuses to open and discharge the contents into the intestines. In such cases vomiting sets in and the incomplete chyme is thrown out. Mere drinking of water allays the nausea by diluting the acid flow. Addition of a little soda bicarb to the water makes it antacid and helps to correct the condition of the stomach and relieve nausea.

Creosote in a suitable form and iodine in one minim dose in an ounce of water are powerful in arresting vomiting. Calomel in fractional doses acts like a charm to soothe irritated stomach and stops vomiting. Soda bicarb also helps by itself. Purging or cleansing the bowels by douche helps to remove toxins and arrest vomiting. Green cocoanut water is helpful so also is lime water. Bismuth carbonate is highly useful in all forms of vomiting and irritative dyspepsia. Drinking of large quantities of saline water to induce vomiting is also very helpful in stopping vomiting. The irritating contents of the stomach are then washed out and relief is obtained.

Often again the presence of water irritates the stomach. Patients on whom other remedies have failed and even morphine injection had only a

DISEASES OF THE DIGESTIVE ORGANS

temporary effect, have been seen to be relieved by swallowing soft rice of the consistency of plastic clay and abstaining from water.

Sea-sickness is also relieved by taking semi-solid plastic food and no water. Here the mechanical action of the nature of food serves as soother. Sun bath, massage and cold baths are necessary to give vigour to the system to enable it to throw off the toxins within the stomach.

Where vomiting is due to a specific disease, it should be regarded as a symptom of that disease and treated as such

Prescriptions

Calomel— $\frac{1}{8}$ grain

Soda bicarb—5 grains

One dose. 6 to 8 such doses every quarter of an hour. It may be given safely in all forms of vomiting

Iodine—1 to 2 minims per dose

In one ounce of water to be given every 3 or 4 hours.

Creosote—1 minim

Incorporated with kaolin or as tablets, one every three hours may be tried as an alternative measure

Soda bicarb—20 grains or 3 tablets

One dose. 3 such to relieve acidity and to stop irritation.

Opium—1 or 2 grains by mouth or morphine hydrochlor $\frac{1}{8}$ grain. Hypodermic injection to be given in case of extreme distress

DYSPEPSIA

Pot. bromide 10 to 20 grains or 1 or 2 tablets
thrice daily to soothe the nerves as sedative

Dyspepsia

It is a diseased state of the stomach in which the organ does not function properly. In some organic affections like visceral inflammations and specific fevers some amount of disturbance of digestion is a constant symptom. Dyspepsia may be accidental or temporary and habitual or permanent.

In some cases dyspepsia co-exists with other diseases having their seats at other parts of the body and not in the viscera, such as gout or rheumatism. It is difficult to say definitely whether dyspepsia is the cause or effect of such maladies.

In habitual dyspepsia the quality and quantity of gastric juice is altered and sensitiveness is increased. Errors in diet, exhausting illness, over work, physical and mental strain are all contributory causes to disturbed digestive function. Eating improper food, eating without proper mastication, eating in a hurry or in worry, drinking too little water and washing the food down the throat by drinking water too often with food, all contribute towards upsetting digestion or setting up dyspepsia. The character and quality of gastric juice varies with individuals, brought on mostly by their own habits or peculiarities of constitution. These peculiarities have to be attended to while choosing food.

DISEASES OF THE DIGESTIVE ORGANS

Accidental dyspepsia may be a slight disorder or a severe one. In mild cases it is characterised by sores in the tongue and mouth or flushing of face, loss of appetite, sense of weight and fullness after meals, heart-burn, flatulence or sour eructations after meals. There may be acidity or dyspnœa, palpitation, headache, constipation or diarrhœa. Accidental dyspepsia may cause giddiness, sleeplessness, irritability of temper, faintness, nausea and vomiting. There may be an attack of colic also.

These symptoms are generally due to errors of diet and can be corrected easily by abstinence from taking food for 24 hours. Water should be given in plenty to allay thirst and specially to flush the system.

Diet after first 24 hours should be fluid and should preferably be dahi. If a man habitually secretes more salivary ferment then he will be able to eat and digest more starchy food while he who secretes more gastric juice will be able to take more dals or protein food. Therefore one must regulate the intake of starches and proteins according to temperaments. Similarly if the liver is sluggish, it will be able to manipulate less fat than otherwise and if more than what can be tackled by the liver is given, the digestion will be upset causing dyspepsia. Diseases of the teeth also interfere with digestion. Teeth therefore should be attended to and anything found wrong there should be corrected.

In infants dyspepsia often occurs on account of quick passage of milk through the stomach into

DYSPEPSIA

intestines The child gets colicky pain after every feeding, the abdomen gets distended and sensitive, the stools lose their bright colour and masses of clotted undigested casein are found in stools The child becomes irritable and clamours for being fed constantly. The remedy lies in giving hygienic diet Often, if a little lime water is mixed with the milk, the child gets well Antacids are good and calomel in 1/20 grain dose with soda bicarb 2 grains for infants is very useful The quantity of food will have to be diminished greatly till the stomach becomes normal

As in children so for adults, dyspepsia has to be cured principally by correct dietary and physical habits The quantity of food should be diminished and only easily digestible foods should be taken and no spices Hard foods require nearly eight hours for complete digestion Therefore a long time has to elapse after a meal before the stomach can be ready to take another If the meal is of soft material, it can then quickly pass from the stomach to the intestines Sometimes it so happens that too much gastric juice is poured on the food, as a result of which the pylorus gets irritated and refuses to open and allow passage of contents of the stomach to the duodenum If a little food is ingested at this time then the troubles due to irritation of gastric juice disappear A little bicarbonate of soda may do the same thing.

In dyspepsia the symptoms are much the same as in chronic gastric catarrh There are loss of appetite.

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an uncomfortable sense of fullness on taking food, flatulence and distension of the stomach. Whereas in gastric catarrh the tongue is coated and breath foul, in dyspepsia it may not be so. Sometimes the heart is reacted upon which becomes feeble, irregular and dilated. Sometimes a burning sensation in the throat or at the region of the heart is felt. The latter is called heart-burn. Treatment in such cases should be directed towards restoring the tone of the heart as well as that of the stomach. Constipation is a common and troublesome symptom and attempts should be made to remove it by massage and douche.

Treatment should be directed mainly towards regimens and dietetic improvements. If the patient is in the habit of swallowing hurriedly he should be directed to change the habit and swallow food after proper mastication only. Saliva supplies juice for conversion of starch into sugar and once the starchy portion of our food misses the contact with saliva on account of hurried swallowing, it cannot receive digestive treatment before it reaches the intestines. Therefore no food should be swallowed before it receives the full and necessary quantity of saliva from the mouth.

Then again the deficiency of admixture of salivary secretions may be somehow and with difficulty be made up in the intestines but the mechanical treatment is that food received from the teeth cannot be supplied once it gets past the mouth. Food should

TREATMENT OF DYSPEPSIA

be thoroughly disintegrated by chewing and persons who are suffering or are likely to suffer from digestive troubles should be taught this elementary lesson

If the gums are tender or teeth defective, for which proper chewing cannot be performed, then attention should be given to cure these or change the diet to liquid or soft food so that the difficulty may be overcome. Sweets excite acid fermentation and those who have weak digestion should be careful to take only very moderate quantity of sugar in any form

Everything should be done to give the stomach the rest it requires. It should be remembered that dyspepsia is the protest of the stomach against continued ill treatment

Sitting in a sloping posture, working in dark rooms, want of proper exercise are separately or in combination causes of dyspepsia and these habits and conditions should be changed

The patient should remain calm and try to remain cheerful in order to throw off habitual dyspepsia. Nervous condition has a direct and important bearing on digestion and dyspeptics can certainly improve by cultivating a healthy and cheerful aspect of life

Where a patient drinks habitually only a little water he would be directed to take 6 glassfuls of water in course of the day. Sufficient physical exercise should be taken and food should be taken only to meet the minimum needs. Over-eating should

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be forbidden and any error should be on the side of eating too little.

The skin should be made to function by friction or massage and cleansing with moist towel and then water bath should be taken. Bathing in cold water is invigorating and helps to make the body attain a healthy tone by quickened circulation and soothed nerves.

Sun bath without over exposure should be given for sometime every day. Massaging the entire body while having sun bath is a good practice.

Massage of the stomach is necessary for the habitual dyspeptics. Massage should not be begun immediately after a meal. The patient should be on his back with the legs flexed. The attendant should stroke the stomach all over gently in the beginning, gradually increasing the pressure. This is only to prepare the patient for the kneading operation to follow. Pressure at strokes should be gently increased till it can be developed to a kneading movement. The movement with simple pressure should be directed from left to right or from the entrance of the stomach to its exit end at the pylorus near the liver. This massage gives tone to the stomach, induces circulation and helps the stomach to discharge its contents through the pylorus. If any imperfectly digested substances are left in the stomach from the previous meal, they are helped to be removed and discharged into the intestines. Massage of the stomach should be followed by massage of the intestines. Here the pressure should begin from the

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right-handed corner or from the appendix. The pressure should be directed upwards and then pass under the ribs to the left side and then down towards the rectum following the large intestine. There comes a sense of relief in dyspepsia by well directed massage and it very greatly helps to cure it.

Walking is a good and all round exercise for dyspeptics, so also is swimming, but is not enough for giving tone to the muscles of the stomach. This can be done by lying on back on bed and raising the legs slowly to a vertical position and then gradually letting them down to horizontal. Both legs at the same time then one leg at a time, should be thus lifted up and lowered down taking care that the upper part of the body does not move during these manipulations. A few minutes' exercise as above will be very helpful in promoting circulation in the stomach and also throughout the body and of strengthening the muscles of the abdomen.

Bowels should be kept clean and the mechanical assistance of douche should be taken whenever necessary. Medical treatment should follow symptoms. For removal of accumulated debris in the stomach washing out by making the patient take large quantity of saline water and then vomiting is a good method. The stomach may be washed out by the stomach tube also. For acidity soda bicarb should be given after each meal. As much as half an ounce of soda bicarb may be given daily to neutralise the extra acids that may be formed.

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For soothing we have bismuth. As antiseptics garlic and thymol are very good. Whereas for improving digestion papaya is invaluable. It supplies the enzymes which the stomach lacks. Calomel in fractional doses is to be given in troubles arising from dyspepsia. For improving tone, bitters and carminatives are useful. Arsenic and nux vomica are useful in giving tone to the organs. It must be remembered that medicine can supplement regulation of diet and regime but cannot do their work. A dyspeptic will remain a dyspeptic in spite of all the medicines he may take, if he will gorge himself with food which he cannot digest, will not exercise, will have meals at irregular hours, take spicy and too hot food and drink and refuse to chew or eat slowly. Dyspepsia is invited by such habits which no medicine can cure.

Prescriptions

Myrobalan—2 to 3 fruits in paste or 6 to 9 tablets should be taken daily at bed time.

Calomel— $\frac{1}{2}$ grain

Soda bicarb—20 grains

One dose daily 4 such doses in case myrobalans are not given

Papaya (milk) 10 drops

Bismuth carbonate 5 grains

One dose. 3 such daily for confirmed dyspeptics.

COLIC

Soda bicarb—3 to 6 tablets

One dose 3 to 6 such doses daily, according to the nature of acidity

Arsenic—1/20 grain

Nux vomica—2 grains

One dose. 3 such doses after meals daily. Very obstinate cases of dyspepsia show improvement with administration of arsenic-nux vomica

Colic

This term is used for all severe gripping pains in the bowels, urinary system and the liver. It is given various names according to the causes and circumstances. When the pain is sudden and spasmodic, it is termed stomach-ache. When there is vomiting it is called bilious colic. It should be distinguished from hepatic or biliary colic due to a stone passing through the common bile duct. When the colic is due to indigestion of food it is accidental colic. It is called renal when it is due to a stone in passages of the kidneys. Colic for any cause in intestine small or large is called intestinal colic.

Colic often comes on suddenly with spasmodic, gripping and twisting pain in the bowels. There are faintness, nausea and perhaps vomiting. The patient lies on his back on bed and folds the legs and presses them over the abdomen to put pressure on it which gives a sense of relief. This distinguishes the ordinary bilious or accidental colic from inflammatory

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colic. In cholera there is also intense colic-like pain and it should be differentiated from colic by accompanying diarrhoea, vomiting and purging of white fluid. Rupture also at first resembles colic. For every case of colic enquiry should be made about the cause and diagnosed.

A frequent cause of colic is the presence of irritating substance within the intestines, mechanical distension through hard faecal concretions or presence of masses of intestinal worms. The retention of gas through constipation is a common cause of colic. Excess of food, eating of unripe fruits are frequent causes of colic. Exposure to cold may also induce colic specially in rheumatic subjects. In colic the first attention after a diagnosis of indigestion should be given towards emptying the stomach. Large quantities of strong solution of common salt should be given to be drunk. This will cause vomiting. Tickling the throat a little after drinking salt water, may readily induce vomiting. But plenty of water must be drunk to effect successful vomiting. If this is not effective copper sulphate solution should be given, failing which the stomach should be washed out by lavage.

Bowels should be relieved by douche. If one application does not cleanse the whole of waste material accumulated in the intestines then a second or a third douche may be given. The pain of colic which is often unbearable can be immediately brought under control by the use of opium in 1 or 2 grains

TREATMENT OF COLIC

dose internally In intense pain requiring immediate relief, opium may be administered in the form of morphine hydrochlor as injection

External application of opium and datura over the stomach also soothes the pain As a purgative castor oil should be tried

Calomel and soda bicarb should be given to remove acidity of the stomach and relieve flatulence which accompanies colic Pot bromide does wonderfully well as a sedative in certain cases, particularly in children In infants, clots of casein may cause colic After moving the bowels in such cases milk mixed with lime water or soda bicarb should be given In cases of colic due to intestinal worms, these should be expelled by santonin 1 to 3 grains doses at bed time on three successive days followed by morning saline purges For habitual flatulent colic creosote, thymol and garlic often do good. For relieving pain hot fomentation with turpentine oil on the stomach is useful

Diet should be discreetly given so that there may be no strain on the digestive system Dahl and gruel may be given for a few days

It is difficult to obtain speedy relief in neuralgic cases The tone of the organs may be attempted to be improved with the help of arsenic and nux vomica

Rest should be given to the stomach and to the whole system Massage particularly over the intestines, application of cold bath, sun bath and light exercise during convalescence are helpful

Colic in Children

Infants are prone to a mild type of abdominal pain caused by indigestion due to excess or erratic food, hasty feeding or some indiscretion on the part of the mother in case of breast-fed infants. Massaging followed by hot application has a good effect in such cases. If the pain be severe, cold mud poultice may be applied with regulation of diet. Castor oil may be used as a massaging basis and this will induce evacuation of the bowel in a mild form. Soda bicarbonate in 3 grains doses may be given for a year old child.

When acute symptoms pass off, castor oil emulsion should be given to purge, care being taken not to make the dose too high.

Regulation of food of the baby and mother is also an essential point.

Prescriptions .

Copper sulphate—5 to 10 grains In 4 ounces water one dose as emetic, where strong solution of common salt fails. The patient should be given 2 to 3 glassfuls of water to drink first.

Opium—1 or 2 grains

One dose to be given where pain is unbearable even after evacuation of the stomach.

Calomel— $\frac{1}{4}$ grain.

One dose 4 to 8 such doses with soda bicarbonate 30 grains per dose.

Antiseptics are to be given in the form of creosote to the minimum or thymol $\frac{1}{4}$ grain or garlic half dram.

CONSTIPATION

soda bicarb half dram to relieve flatulence Potass bromide 15 to 30 grains dose for soothing, 3 times a day.

Constipation

Constipation is an abnormally prolonged retention of faeces Faeces may be expelled with difficulty This is accompanied with more or less disturbed health There is no doubt that by more than normal stay in the colon, faecal or waste matter fit for discharge gets partly absorbed resulting in toxic condition of blood But this is not all The very fact of the accumulation of faeces produces undue mechanical pressure on the various abdominal organs and upsets normal condition of nerves Evacuation by enema gives immediate relief That the distressing symptoms were not due to poisoning alone is proved by the fact that evacuation gives immediate relief The toxins surely are not taken away the moment the faeces are removed.

Causes of constipation should be gone into in order that it may be successfully treated It is generally due to faulty dietetic habits Too highly concentrated foods or drinking of less than the requisite quantity of water, give rise to hard stools which may refuse to move with peristalsis of the intestines The chief function of the colon is to hold faeces till it is convenient to defaecate It is, so to say, a waste material store waiting discharge The

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inability of the colon to force out the faeces in proper time is generally due to the insufficiency of motion caused by weakness of muscles or the faeces may be of such abnormal consistency that they do not give sufficient stimulation and are difficult to be propelled.

Errors which lead to constipation whether hygienic, dietetic or otherwise should be corrected before medicinal treatment is attempted. Faulty habit about irregularity of time to sit for defaecation is a cause of constipation. Correct habit should be formed by trying to defaecate at the appointed time, sitting at ease all the while. In order to be properly manipulated by the colon, the contents must be semi-solid, non-irritating and free from undigested food particles. This of course depends upon the diet. A quantity of cellulose is necessary to give the necessary bulk and character to the stool. Vegetables supply this, as has been described while dealing with Nutrition. Prolonged use of artificially digested foods is apt to give constipating character to the stool. Often too dry a diet may cause constipation. The proper quantity of water should be drunk after each meal to keep the mass within the stomach and intestines in a soft condition.

Habitual constipation is usually accompanied by disagreeable symptoms such as loss of appetite, coated tongue, bad taste in the mouth, impaired digestion, flatulent distension, difficult breathing, malnutrition and anaemia, headache, flushing of the face, sores in the mouth, irritability of temper, disturbed sleep etc.

CONSTIPATION

Bowels should be evacuated with the help of a laxative like myrobalan or calomel Enemata with the help of douche is to be given wherever possible so that defæcation may be accomplished without the action of medicines which are of questionable use in habitual constipation Mechanical aid to expulsion of faeces should be attempted to be obtained by taking isafgul or linseed mucilage Bael is a food and an aperient and is of great value Castor oil in small doses is quite good Soft paraffin in warm water as a substitute for liquid paraffin is a good lubricant helping expulsion Other bland oils may also be taken according to taste

If the stool accumulation is too hard and if the tube of enema cannot be introduced on account of the blocking, then the lubricated finger should be introduced to manipulate and draw off the obstructing pieces In certain cases enemata has to be given daily for a long time to bring the system to normal condition. Often prolonged use of enemata induces the habit and there is no motion of bowels without a daily wash out If the muscles have not lost their tone then by gradual lessening of the quantity of washing out water and use of internal lubricants like paraffin and external help of massage, natural condition may be restored. Massage is a powerful restorer of normal defæcation

Accidental or occasional constipation may be overcome by the use of aperients or purgatives such as calomel at bed time or myrobalans or magnesium sulphate $\frac{1}{2}$ ounce in the morning

Where constipation is due to absence of roughage or bulk in food, the error should be corrected by including vegetables in the diet which will give the necessary bulk and remove constipation. Bran is a good laxative in this direction and should be included in the dietary. Mangoes, bael fruit, papaya and other similar fruits of season may be taken and usual starchy food given up or partially replaced by fruits. Fruits are great helpers in bringing a constipated constitution back to health.

Prescriptions :

Myrobalans 3 or 4 fruits at bed time.

Calomel 1 to 3 grains followed by saline aperient

Castor oil— $\frac{1}{2}$ to 1 ounce

In one dose for occasional constipation.

Soft paraffin $\frac{1}{2}$ to 1 ounce in hot water for internal lubrication or mechanical action.

Diarrhoea

In diarrhoea the contents of intestines are thrown out more quickly than is normal and the purgings are different from normal faeces. It is often but not always due to inflammation of the mucous membrane of the intestines. What is thrown out consists of some formed stool mixed with some undigested and unabsorbed material, inflammatory exudation and intestinal secretion.

On most occasions diarrhoea is due to local irritation for which offending material passes down

DIARRHŒA

into the intestines Indigestible or irritating food or too much of food may cause diarrhoea Food may receive too much bile or too little bile In both cases intestinal digestion will be interfered with If there is too much bile, the chyme will be too alkaline and if there is too little, it will be too acid Chyme will not be converted fully into absorbable product and will cause diarrhoea although the character of diarrhoea will be quite different in the two cases

Where there is too much bile secretion, the stool is coloured yellow or green The ingested material in this case causes irritation and therefore diarrhoea Bile is alkaline in action The defect due to excess of bile points towards correction with the help of acid While there is too little flow of bile due to defect in the liver or in the mechanical closure of the bile duct, the ingesta become too acid and irritate the intestines and cause diarrhoea The faeces are clay-coloured or white and offensive Such a condition indicates the necessity of more bile and therefore some alkali to start with to change the character of the ingesta

If faeces remain for a very long time in the intestines on account of sluggish movement of the bowels then they may form into very hard lumps or concretions These may set up catarrh of the intestines by mechanical action and also through the toxins they may be producing Chill on the surface over the stomach may cause intestinal catarrh and thence diarrhoea Defects in the circulatory system

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of the intestines or abdomen may affect the intestinal walls and thereby cause diarrhoea

Microbes of an infective character may find their way into the stomach and cause diarrhoea. Such diarrhoeas are generally seasonal and endemic or epidemic. Infection of milk or of drinking water causes such diarrhoea and the house-fly is no less a factor in spreading it. In case of diarrhoea caused by errors of diet or by influence of climate, the onset is preceded by signs of loss of appetite. Then when it develops there is early vomiting and stools are frequent. Excess of starch gives a frothy character and creates distension of the abdomen. Stools look green. Excess of fat in food makes the stool greasy and whitish while excess of protein makes stool tough and lumpy. Such cases respond easily to starvation.

In diarrhoea due to infection there is high rise of temperature and the collapse comes early. The stools vary in number from 2 to 20 in a day. This is not readily responsive to starvation or to treatment.

Diarrhoea is sometimes attended with colic or pain which is relieved on evacuation. In some cases there is flatulence and in others fever is present. In acute diarrhoea there is much loss of serum from blood. Blood becomes thick, then there is great thirst and if it is not relieved, cramp follows. There is a feeling of great exhaustion too, if much serum is thrown out of blood by diarrhoea.

For treating diarrhoea we should look to the diet first. As it is due to some disturbance in the

TREATMENT OF DIARRHEA

intestines it is best to give the intestines rest by abstaining from any food whatever and only to drink water to allay thirst

In mild cases where some food may be given, it should be in liquid form and all foods which are likely to leave undigested residue should be avoided Dahi is best under most conditions diluted with thin sago or barley water Simply barley water may also be given It should be remembered that abstinence from food for a day or two cannot do any harm, on the contrary, may be helpful in restoring normal condition Milk from which casein has been precipitated or whey may be given It is non-irritating and is exceedingly harmless

In less acute stage, dahi mixed with soft farinaceous food as rice or sago is helpful Thirst should be allayed by giving small doses of water to drink Where there is vomiting, only spoonfuls of water should be given so that water may be retained But if vomiting cannot be stopped and there is much loss of water saline should be injected Where chill has been a factor, diet regulation along with rest and warm bandage on the stomach will be helpful Baths are of course useful and should be given avoiding exposure to the stomach

Massage of the abdomen and of the whole body is a great help in bringing back normal condition The abdomen should be exposed to sun, if possible The intestines should be cleared of accumulated faecal matter and offending ingesta A douche with a long

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tube used as an enema is very necessary. This will not only wash away faeces but also the toxins rendering the process of recovery easy. The work of cleansing up the bowels may be helped by taking some aperient as myrobalan, castor oil or calomel.

When the character of stool indicates excess of bile, some acid say, lemon juice should be given. Where want of bile secretion is indicated and the stool is acid, alkali in the form of soda bicarb or lime water should be given.

Calomel is one of the most dependable medicines in diarrhoea. It corrects the septic character of intestines and at the same time works as an aperient. It may be given in $\frac{1}{4}$ grain doses every 15 minutes or half an hour up to 8 or 12 doses a day according to the character and vehemence of attack. Calomel has further the property of checking vomiting and soothing the system. If there is one medicine in diarrhoea it is calomel in fractional doses. In many cases cholera has been averted by the early use of fractional doses of calomel.

We have already seen that diarrhoea is due to intestinal catarrh. Bismuth is the soother of such inflammation and should not be forgotten. Bismuth enjoys great reputation in the treatment of intestinal catarrh. In the form of salicylate it is both soothing and antiseptic and is specially indicated where the excreta are putrid or offensive. But this does not mean that it can supplant calomel. Bismuth is reduced to black metallic condition in the intestines

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and then the film of metal acts as a protective coat. The stool becomes black on administration of bismuth. Bismuth may be given in 20 to 60 grains doses thrice daily up to 180 grains a day. In cases of acute diarrhœa where it is difficult to arrest the course of the disease with such simple remedies as above, we may look to opium for bringing the required relief. Opium has a most remarkable influence over the circulation in mucous membrane. It relieves pain and spasm and a dose or two should not be withheld. Half grain of opium with the first three or four doses of other medicines will be very useful. Children do not often tolerate opium but they need this more than adults for soothing the hypersensitiveness of the mucous membrane. 1/20 grain of opium can be given to children of a few months old. Some are not in favour of giving opium to children but minute doses have such curative effect that this valuable drug should not be discarded. Where introduction by the mouth is not desired, morphine hydrochlor may be injected hypodermically. In acute and severe diarrhœa of children injection of morphine in 1/100 or 1/80 grain dose is to be repeated in an hour and again if not better. Osler says that this drug alone commands the situation in acute choleric diarrhœa of children.

In green diarrhœa of infants sour dahi or alum is useful introducing acid in the system. In chronic forms of diarrhœa which has resisted treatment in acute stage, great care should be taken in choosing the method of treatment. Medicines will not be of

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much use. The dietary habits should be examined and corrected. Care should also be taken to find out whether diarrhoea is not due to any organic disease.

Diarrhoea may often be found mixed with attack of dysentery. Treatment should be suited to the symptoms of both.

Prescriptions .

Calomel— $\frac{1}{4}$ grain

Soda bicarb—5 grains

One dose. 6 to 12 such doses every 15 minutes in acute cases.

Opium— $\frac{1}{2}$ grain

Bismuth salicylate—5 grains

One dose. 3 to 6 times a day Useful both in acute and chronic forms.

Soda bicarb—5 grains

Thymol— $\frac{1}{2}$ grain

One dose 3 to 4 times a day in diarrhoea.

Dysentery

In dysentery the mucous membrane of the large intestine gets inflamed and ulcerated. The predisposing causes of dysentery may be the whole range of events catalogued in gastric ulcer, but whatever be the inducing cause, dysentery is due to the action of specific germs. The disease is propagated by contagion and infection. Two types have been broadly classified, the amoebic dysentery

DYSENTERY

and bacillary dysentery. Certain climatic conditions help the prevalence of dysentery. When men mess together under unhygienic conditions, dysentery occurs and continues to cause trouble till the origin is traced and causes removed. Although the bacilli are very dangerous, yet they produce a sort of immunity on those who live constantly in an atmosphere of contact with them. The hospital sweepers who on many occasions breathe the dust of infected floor show presence of bacilli in their stools while they themselves enjoy immunity. These and like persons then become carriers of the disease infecting persons with whom they may mess.

Dysentery may be acute and chronic. In acute form there are pain in the abdomen, diarrhoea and the motions become dysenteric. Yellowish white mucus passes with stools, sometimes only the more or less blood from the intestinal ulcers. The evacuations are preceded by pain and tenesmus and a constant desire to evacuate, although there may be nothing to throw off except a little mucus and blood. There is a feeling of pain in the rectum and along the large intestine. With the advance of the disease the quantity of mucus and blood increases and occasionally casts or shreads of skin-like mucous membrane from small fragments to 12 inches or so long and an inch wide are seen to pass out with motions. This indicates so much eating away of the intestinal wall. Sometimes pus is also thrown out with motions and often the smell of the stools becomes very foetid. The whole of the digestive

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processes are upset and secretions are changed or stopped. The saliva becomes acid instead of being alkaline and the gastric juice itself may become alkaline. The stomach loses power to digest and absorb food and in addition to this the bacilli create toxins and the foetid matters formed also augment further manufacture of toxins and their consequent absorption in blood.

Chronic cases are after-effects of acute attacks. The patient does not recover completely, stool remains putrid and may contain blood while diarrhoea and constipation may alternate and general health is disturbed. During periods of acute attack the temperature may rise, whereas it may occasionally become subnormal also.

Dysentery used to be more fatal than it is now. New hygienic knowledge has helped to restrict its spread and better methods of treatment have brought down the mortality and minimised suffering. Dr Rogers successfully popularised the form of treatment by injection with emetine hydrochloride in place of ipecacuanha. Subsequently kurchi has been given a very high place.

In dysentery the treatment should be for removing the offending and toxic matter from the intestines and for alleviating painful symptoms, stopping the virulence of the bacteria and promoting healing of the ulcer.

It is a time-honoured practice to give small doses of castor oil in form of emulsion. This acts as a mild

TREATMENT OF DYSENTERY

aperient and causes quicker removal of offensive matter, minimises the strain during motion and also acts as a lubricant to the ulcerated surfaces In addition to administration of castor oil, the mechanical removal of accumulated poisonous matter should be attempted by giving very low pressure enema admitting as much water as the patient can tolerate This can be done twice or thrice daily

If there is much pain or blood in the stools, an injection of emetine hydrochlor should be given at once It has been often found that a daily injection for three days is quite enough, but in very resisting cases two injections may be given on the first day

The action of emetine hydrochlor should be supported by giving kurchi by mouth Kurchi, bismuth and bael are the three most potent healers Where the condition is not very serious, emetine injection may not be necessary Isafgul is very efficacious in chronic cases of dysentery with kurchi

In bacillary dysentery emetine is not effective. Whether an attack is of amoebic or bacillary form, dysentery cannot be properly determined without bacteriological examination But if emetine and kurchi fail to act, it would be wise to conclude that it may be bacillary or a case of combined attack Treatment with emetine, kurchi and bismuth as for amoebic dysentery should continue with the addition of magnesium sulphate which is effective against bacillary attack. In bacillary attack kurchi and bismuth also have their place Children as a rule, rarely suffer

DISEASES OF THE DIGESTIVE ORGANS

from amoebic dysentery. For them dysentery treatment should commence with castor oil emulsion and magnesium sulphate as for bacillary dysentery.

If there is vomiting it should be stopped by giving iodine in one minim doses or by calomel in $\frac{1}{4}$ grain doses with soda bicarb 10 grains. When the case protracts, it is better to introduce iodine in blood through intravenous injection. The case may be complicated by other infections and iodine as an all round anti-infective, is useful in all cases of infection. Where the condition of the stomach needs something more than calomel, garlic and thymol may be given. When persistent purging continues in spite of all efforts to stop, starch enemata should be given containing 2 to 3 grains of opium mixed with starch solution.

Where the anus is tender by frequent passing of motions, local application of a little myrobalan paste with one grain of opium per dram gives relief. Datura and opium may be painted over the abdomen to relieve pain. In case of great pain opium may be given by mouth to obtain relief.

When the patient is run down and is in a collapsed state on account of the very numerous evacuations in bacillary dysentery, the tone should be kept up and collapse overcome by injection of subcutaneous normal saline.

As regards diet it is best to offer as little food as possible to the irritated and inflamed intestines and a disturbed stomach refusing to secrete requisite

TREATMENT OF DYSENTERY

juices Plain water or whey may be given for several days If the patient is very weak some dahi thinned and beaten with water may be given several times a day Dahi combats offending bacteria and helps establishment of helpful micro-organisms in the intestines

The patient should be given rest according to the seriousness of attack Movement induces pain and aggravates distressing symptoms It is best to confine the patient to bed and give nothing but some dilute dahi for diet in order that the disease may be cured rapidly Milk is difficult to digest and the absence of proper juices in the stomach, forms hard clots which become source of much trouble and pain to the patient Milk need not be given at all

Prescriptions .

Calomel— $\frac{1}{4}$ grain

Soda bicarb—10 grains

One dose 4 such doses daily in chronic or acute cases

Castor oil— $\frac{1}{2}$ to 1 dram

Emulsified with acacia mucilage 4 doses to be given at intervals of two hours for the first two days In cases associated with vomiting castor oil emulsion in fractional doses of 5 minims of oil per dose along with two grains of soda bicarb, every two hours up to 8 doses daily has been found to be very effective

Kurchi—20 to 30 grains or 5 to 6 tablets

Bismuth salicylate—5 grains or 1 tablet

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One dose. 3 to 4 such doses daily till stool becomes normal.

Iodine—1 c.c.

Inject where complications are apprehended in acute cases and always in chronic cases.

Emetine hydrochlor— $\frac{1}{2}$ to 1 gr. in 1 c.c. hypodermic injection daily for 3 days or in alternate days

Isafgul— $\frac{1}{2}$ to 2 drams doses as demulcent drink in acute and chronic dysentery.

Magnesium sulphate—1 dram

One dose every two hours. It is a specific for bacillary dysentery. To be used when emetine-kurchi fails to give full satisfaction.

Opium as starch enema in 2 to 3 grains per dose mixed with arrowroot or barley water.

Appendicitis

Inflammation of the vermiform appendix is commonly known as appendicitis. As the term is now used, inflammation in the cæcum and near about the appendix, even if the appendix is not itself affected, is called appendicitis. Appendicitis may be due to some faecal concretion or foreign body being stuck within the appendix. *Bacillus coli* is commonly associated with the inflammatory process. It is frequent in chronic dyspeptics and persons who eat hastily and do not properly masticate their food. Rheumatism is a predisposing factor and in some cases on administration of sodium salicylate the symptoms

APPENDICITIS

rapidly disappear Appendicitis may arise out of a general toxic condition It is associated with typhoid, tonsillitis, pneumonia and septic fevers Amœbic infection is also often a factor in causing acute or chronic appendicitis

In many cases appendicitis may be detected with mild symptoms Pain in the abdomen, tenderness in the region of the appendix, muscles about the centre of pain showing rigidity are some of the indications There may be a deep-seated swelling or the swelling may be immediately beneath the wall of the abdomen

Absolute rest in bed should be given and the tumour should be watched Purgative should not be given Colon should be washed with the help of douche When the case gives indication of suppuration, surgical aid should be sought for.

In some, appendicitis occurs in chronic form The patient has recurring relapse of pain in the region of the appendix The pain continues for weeks and months Again there is some interval of freedom from pain During the periods of pain, constipation and flatulence may be present. In some other cases there is daily evening rise of temperature and suppuration has taken place in the form of an abscess coming to the surface Then the abscess should at once be opened and pus drained out When it is suspected that the abscess is formed deep below and palpation shows suppuration, a surgeon should be called for When there is a break of the intestinal wall and faecal matter enters the peritoneum, rapid toxic

DISEASES OF THE DIGESTIVE ORGANS

symptoms appear. It is then too late to be operated upon. The foul matter may be depended upon to be absorbed, if not death will follow.

Generally treatment should begin with cleaning the bowels by enema and giving rest to the patient. Even when the acute stage is over, the patient should be confined to bed for a few weeks. Bismuth salicylate should be given as an antiseptic for soothing pain, opium in proportion of 1 grain to a dram of paste with datura as basis should be given as a plaster over the tender region. Any impacted faeces may be dislodged by gentle massage and a laxative like calomel in $\frac{1}{4}$ grain dose, 4 or 6 doses being given in a day followed by myrobalan 3 fruits for a dose.

If the onset is due to amoebic infection, as indicated by passing of mucoid stools in hard or soft state, the treatment should begin with injection of emetine hydrochlor in $\frac{1}{2}$ grain doses up to 6 doses in a week.

Gastric ulcer or cancer sometimes shows symptoms similar to appendicitis. The history of the patient and the existence of a tumour may help identification.

Liquid diet in the form of whey and fruit juices only should be given in acute cases. In cases of failing strength some glucose may be given. The patient should be given sun bath without lifting him from bed. The skin should be kept clean by warm sponging and circulation helped by gentle massage.

In chronic cases easily digestible liquid food like milk, dahi and sago or arrowroot water may be given. Green vegetables, dals etc. should not be given.

INTESTINAL OBSTRUCTION

When there is a danger of toxæmia and also where in chronic cases relapse occurs very frequently, a surgeon should be brought in

Prescriptions

Garlic $\frac{1}{2}$ dram juice per dose as internal antiseptic.

Calomel— $\frac{1}{4}$ grain

Soda bicarb—5 grains

One dose 4 to 8 such doses daily

Datura—1 dram

Aconite—1 dram

Make a paste with smallest quantity of water and apply over the tender region with fomentation at intervals

Opium mixed in proportion of 1 grain per dram with the datura aconite paste

Bismuth salicylate—10 grains

Soda bicarbonate—10 ,,

One dose 3 such doses daily

Intestinal Obstruction

This is closing of the intestinal canal due to various causes. The intestines may be blocked by accumulated matter within it. Indigestible substances taken with food or concretions formed within the intestines through errors of diet may cause obstruction. The intestine may be obstructed by the pressure of the other visceral organs or there may be a constriction developed within the intestine itself due to cicatrix as after-effect of dysentery and most generally it may be due to twist of a coil of intestine or strangulation.

DISEASES OF THE DIGESTIVE ORGANS

or intertwining of the intestine. Sometimes bowels refuse to move on account of paralysis. A great number of these cases cannot be treated medically, surgical operation being necessary. In the milder forms where obstruction may be just commencing, massage and enema and restriction to absorbable fluid diet may help but in advanced cases generally speaking any medicine introduced through the mouth aggravates symptoms. Every case of intestinal obstruction should be commenced with fractional dose of calomel and soda bicarb.

Prescriptions :

Calomel— $\frac{1}{2}$ grain

Soda bicarb—10 grains

One dose every half an hour up to 12 doses
Then followed by half to one dram dose of mag.
sulph every 2 hours.

Strong warm water enema should be given first of all and hard stools in the rectum removed by fingerling, if possible. Turpentine stupes should be applied on the abdomen. To allay the spasms datura may be given in decoction form as drink, maximum dose being 20 grains of leaves per day.

Opium in 1 to 2 grains dose may be used in very acute cases.

Cases are on record which have responded to the above course of treatment in patients where the obstruction was due to hard stools after taking of meat etc. in large quantities.

PERITONITIS

Obstruction due to knots in the intestinal gut and not due to fault of eating is not amenable to above treatment. If repeated enema, calomel and mag sulph etc produce no effect, the case should be regarded in a serious one and a surgeon's aid should be taken. Water and nutrition should be supplied through the rectum. Thickening of blood through want of sufficient intake of water should be prevented by intravenous introduction of sufficient quantity of normal saline. This will allay thirst and help the formation of urine.

Peritonitis

The inflammation of the peritoneum is due to wound or injury of the abdomen or some other diseases. When in ulcer of the stomach or duodenum or in appendicitis the wall of the organ concerned suppurates and perforates, the contents are then discharged into the peritoneum. This may occur in a lot of diseases such as tubercular, typhoid, dysenteric or cancerous ulcers of the intestines, in liver abscess, in perforation of the gall bladder, diseases of the bladder or ovaries or uterus. All these cause offending material to be lodged in peritoneum which creates sepsis owing to the discharge of micro-organisms in the peritoneal cavity.

Local peritonitis may be due to adhesions. Peritonitis causes severe pain in the abdomen and there is great tenderness. Tympanites occurs owing

DISEASES OF THE DIGESTIVE ORGANS

to inflammation of the muscular coat and generally there is absolute constipation. The digestive organs refuse to work causing foul breath, dirty tongue, loss of appetite, thirst, nausea and vomiting. The temperature gets up to 104° or 105° F Pulse is rapid. Urine becomes scanty. In grave cases there is collapse followed rapidly by death

The disease requires a surgeon's intervention. The peritoneum has to be opened and offending material drained out. If the disease has so far spread as to make an operation at that stage useless, it would be for the physician to give what relief he can during the short hours that the patient may live.

The patient should be kept at rest. No food should be given by mouth. Saline injections should be given to allay thirst and to keep up general tone

In mild cases boric fomentations may be applied over the abdomen which may help absorption of offending material. Absolute rest should be given and attempts should be made to relieve the intestines by washing out with the help of an enema.

If a surgeon is not available in the earlier stages. treatment should be to give calomel $\frac{1}{4}$ grain, soda bicarb 10 grains, 6 or 8 doses daily. Opium may be given by mouth in 1 or 2 grains doses or hypodermically 1 c.c. of $\frac{1}{4}$ grain of morphine hydrochlor Datura leaves made into a paste should be plastered over the abdomen to allay pain.

In peritonitis after delivery, the parts should be kept aseptic by iodine lotion douching. If it is due

INTESTINAL PARASITES

to liver troubles, emetine hydrochlor $\frac{1}{2}$ grain in 1 c.c. may be injected Sedatives as chota chandra in 30 to 60 grains doses 3 times daily may be given

Intestinal Parasites

Round worm and thread worm are the commonest. Another troublesome worm is tape worm Hook worm is another no less troublesome and causes grave injury to the system We shall take some of these parasites one by one

Round Worms —The worms are 6 to 12 inches long Several of them remain clustered together or singly. It is not unusual to find as many as a dozen of them expelled on treatment The females lay eggs which are discharged with faeces These eggs are remarkably resisting to outside influences and may remain alive for years waiting for the proper environment to be developed into worms They may gain entrance into the human stomach through contaminated drinking water Bathing in and drinking of river or tank water contaminated with faeces having these eggs are mostly the sources of contamination In bathing some water inadvertently might get into the mouth and whether it is drunk or only squirted out, injurious particles may gain entrance into the stomach.

Salivation, itching at the nose, loss of unreasonable appetite, swelling of the abdomen and emaciation, grinding of the teeth during sleep are the symptoms.

DISEASES OF THE DIGESTIVE ORGANS

eggs setting free the young embryos within the stomach from which they pass on to the intestines. It causes irritation of the rectum just within the sphincter. The worms bore here for laying their eggs and this causes tickling and almost intolerable itching. They may be dislodged from their position by the use of purgatives continued for some days. When there is itching in the rectum immediate relief may be obtained by introducing salt solution. A piece of cotton saturated with common salt solution kept just within the anus for sometime successfully destroys the worms there but not the eggs. This has to be continued for several days so that the hatched eggs may come in contact with salt solution to die. Occasional plugging with salt saturated cotton or injection of a little saturated solution through an ordinary syringe is a good plan where itching indicates the presence of the worms. Sometimes the worms come out and roam about the anus. Often their eggs may get into nail corners and cause self-infection or others to be infected unless one is very clean in habits. The worms may enter private parts in women and cause distressing irritation.

Hook Worms :—These worms which are about an inch long have hooks with which they attach themselves to the intestinal wall. They cause languor and a profound degree of malnutrition and anaemia. The working capacity of persons having hook worms diminishes greatly. This worm is responsible for much inefficiency, weakness and emaciation in India. It lays eggs which are discharged through stools.

HOOK WORM . GUINEA WORM

The parasite develops outside and attaches itself to feet of persons walking bare-footed. It bores hole through feet or hands and enters the blood stream and gets lodged in the duodenum.

For treatment thymol in 15 to 30 grains dose has been found to be very effective. The patient should have preparatory purging and be kept fasting or on light diet the previous day. The next morning thymol is to be given followed up by a purgative.

Prescription

Santonin—1 to 3 grains

Calomel— 1 to 2 , ,

Soda bicarb — 5 , ,

One dose to be taken in the empty stomach, followed up by a saline purgative for round worms

Guinea Worm

Guinea worm disease is common in some parts of India, particularly in Maharashtra, Rajputna, the Punjab, Bombay, Madras, Mysore, Central and Northern India. The young of the guinea worm exist in the water of dirty tanks and wells. These invade some crustaceans and live in their bodies. These crustaceans being drunk with water introduce the worm in the intestines. From there these worms make their entrance to various parts of the body. The adult female measures about $1/15$ th inch in diameter and 2 to 3 ft. in length. The worms inhabit the subcutaneous

DISEASES OF THE DIGESTIVE ORGANS

tissues and takes 12 months to reach the skin after introduction into the stomach. The worm secretes a poison on arrival near the skin which forms a blister. The blister then ulcerates from which the female deposits embryos in contact with water.

The worms injure the system and cause secondary bacterial infections. The worms create itching, urticarial eruption, nausea, vomiting, diarrhoea, dyspnoea followed by blister formation and ulceration. The lower extremities are commonly involved. Septic complications such as cellulitis, septicæmia, fever etc are frequent. Contraction of tendons and stiffness of joints also result. Rheumatism may be produced by calcified worms.

The disease may be prevented by drinking boiled water passed through several folds of clean cloth so that the crustacea may be kept out. Treatment consists in withdrawing the thread-like worm. The worm perforates the base of ulcer and discharges embryos through prolapse of the uterus. The end of the worm may be taken hold of by forceps and coiled round a piece of match stick or a feather stem. By delicate management a little may be extracted daily by gradually winding the worm round the quill. Care must be taken not to break the worm and keep it moist. The portion coiled round may get dry and break killing the worm. Alum lotion painted over the extracted portion and dressed with moist cotton prevents breaking. Massage with oil along the line

CHOLERA'

of the worm helps to loosen it. A stream of water directed on the part assists extraction. If the worm is broken, an abscess forms accompanied by fever. The worm then has to be extracted by an incision. A surgeon may extract the worm by an incision under local anaesthesia.

Cholera

Cholera is an acute specific gastro-intestinal affection caused by comma bacillus (*vibrio cholerae*) discovered by Koch in 1883.

Of all infective diseases cholera is a very typical one and shows very great constancy in its main features. Rogel gives a graphic description as under:

"The sudden onset of profuse but painless diarrhoea, the stools rapidly becoming quite free from bile and faecal matter, accompanied by copious watery vomiting followed by extreme prostration with little or no pulse at wrist, cold clammy skin, pinched face, with sunken darkly encircled eyes, extreme restlessness with frequent very painful muscular cramps and complete suppression of urine, all coming on within a few hours, constitute a picture which once seen never fades from the memory and is only occasionally at all simulated by very acute summer diarrhoea of young children and some cases of ptomaine poisoning in adults."

Cholera was and is still regarded as a terrible disease and people get frightened when one is attacked. A sense of utter helplessness pervades the atmosphere.

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Where, with the best of treatment, the mortality was 70 per cent even only in recent years, it is not surprising that a visitation of cholera is looked upon with terror specially as it becomes an epidemic so suddenly and spreads far and wide with so disastrous results.

Bengal is regarded as the home of cholera. At other places cholera is an occasional thing where it suddenly appears in an epidemic form, carries away hundreds of thousands and then disappears. But in Bengal, it is a constant factor in one district or another throughout the year. Medical historians have investigated into the sources of the great cholera epidemics of the world and have traced them all as having originated in Bengal. The soil and atmosphere of Bengal are very favourable for it. The organism concerned in cholera is the comma bacillus so named because of its being shaped like a comma. These bacilli on entering the human stomach lodge on the mucous membrane, multiply and expel all materials from the stomach and intestines and establish themselves as the sole possessors of the tract. But they also die a rapid death and the excreta and vomitings are full of dead as also very numerous living bacilli. Again in a few days the system is purged of the bacilli.

As in the human system, cholera attacks suddenly and fills the intestinal canal with bacilli which die quickly and leave the man quickly alive or dead, so is it with a tract under the grip of cholera. Cholera comes as a fell epidemic and creates havoc but

THREE STAGES OF CHOLERA

subsides quickly in the locality Those who are susceptible to it are carried away by it and those who are left alive are immuned to it It is therefore that after an epidemic in a non-endemic area there is no re-visitation in the locality for two or three years But not so in Bengal Although severe epidemics may depopulate some village tracts, yet it cannot be said that it will not visit them next year There is something in the humid atmosphere and water-logged soil which keeps on cholera bacilli perennially in Bengal unlike dry raised tracts where cholera appears and then disappears leaving no trace but only keeping the field open for the next epidemic from a distant area at some future time

Then again when it appears as an epidemic at a particular place, the first cases are very fatal As the epidemic progresses, its virulence gets milder and milder till about the end of the epidemic, mortality is very few among those attacked Death rate from cholera is higher amongst new comers than amongst permanent residents Death rate from cholera in European hospitals is invariably higher than that in Indian hospitals Those amongst Europeans who have remained for a long time in Bengal have a lower death rate This points to some degree of immunity generated by longer stay on the soil and therefore by longer contacts And it is for this reason that the epidemic dies off quickly and acquired immunity makes the later cases less fatal.

Cholera may show three phases, namely -

DISEASES OF THE DIGESTIVE ORGANS

1. Premonitory stage of early diarrhoea
2. Stage of choleric diarrhoea and collapse
3. Stage of reaction

In the first stage the disease may appear as simple diarrhoea. Without a bacteriological examination of faeces, it is impossible to say if it is a case of diarrhoea or cholera. During a cholera epidemic every case of diarrhoea may be treated as that of cholera. Severe diarrhoea may develop into cholera. But it is not a fact that all cholera cases have to pass through the premonitory diarrhoea stage. Cholera in the most virulent form may often appear quite suddenly. In diarrhoea stage the stool contains bile and there is no suppression of urine although its quantity is small. Pulse is of moderate tension and volume.

The second stage is the stage of strong diarrhoea and collapse. This is manifested by violent vomiting and purging. Stools are quite free from bile. The colour of the stool is pale white and is very characteristic. It resembles washings from rice (rice-water stool). On standing it separates into two layers, the top consisting of clear water and the bottom layer of granular deposits of epithelial cells and intestinal mucous membranes.

Vomited matter is watery and there is no trace of food particles in it, all having been thrown out in a few vomits earlier. The process of vomiting is effortless and very violent. Gushes of fluid are thrown out both through the mouth and nostrils rapidly succeeding one another. The purgings on the

STAGE OF CHOLERIC DIARRHOEA AND COLLAPSE

other hand clear away all the ingesta in the intestines in the first few motions. The later motions only pour forth the characteristic fluid. Here again the purgings come in a gush and continue in such a manner as if a tap has been opened. So between the vomiting and purging the fluid of the body consisting of serum is thrown away. The great loss of liquid produces intense thirst and if any water is drunk it is again immediately partly or wholly thrown out. Still whatever water is drunk gets a change of absorption and may recoup some loss even if it is apparently all vomited out. The attendants on cholera patients out of their ignorance inflict the extreme cruelty of denying water to a thirsty man who may get some chance of recuperation through the water, which at least can do him no harm.

The great loss of fluid acts on the system in several ways. The muscles get devoid of their tissue fluids and cramps set in. These cramps are extremely distressing. Then again, blood gets thickened and the rate of flow therefore becomes less and very sluggish in the extremities. Cyanosis or blue colouration of the finger tips and lips appears and then collapse sets in. The surface temperature goes down although internally there may be febrile temperature. The temperature of a cholera patient should therefore be taken both under the armpit and also in the rectum. When the surface temperature is 95° or 96° F, the rectal temperature may be found to be as high as 105° or 106° F. The reason of the

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lowering of the temperature of the skin is due to the want of circulation owing to the reduction of the quantity of fluid in blood. It is no good trying to raise the surface temperature at this stage by rubbing the skin in massage etc. Any attempt towards raising surface temperature means attempting to draw blood to the skin circulation while the blood has gone to feed the more vital organs. Withdrawal of blood from those organs to the skin will mean making the condition of the patient worse.

The pulse becomes feeble, flickering and ultimately disappears altogether from the wrist. This is all due to the exhaustion of body fluid or serum of blood. Specific gravity of blood rises from 1050 to 1064 or above. This is a dangerous point. If at this stage the finger tips are pricked with a needle and pressed, some dark-coloured thick fluid can be obtained indicating the degraded and thickened condition of blood.

Apart from the state of collapse being brought about by the shortage of circulating blood, it may also be due to weakness of the heart on account of toxic condition of blood. Cholera bacilli produce toxins and these are absorbed by the intestines and then thrown into circulatory system poisoning all the organs fed by blood. Collapse whether due to shortage of fluid or weakness of the heart, comes in with the advance of the disease. Thickened blood slowly moves and blood pressure falls. It is the pressure of blood that keeps a portion of it circulating through the kidneys. With the fall of pressure as also with

STAGE OF REACTION

greater thickening, less and less blood passes through the kidneys till at last no blood circulates through the kidneys and no urine is formed

After the state of collapse, comes the stage of reaction or progress towards recovery. The patient begins to vomit less and retains fluid that may be introduced. The stools get coloured by bile, the specific gravity of blood begins to fall and so also the rectal temperature. The patient seems to be on a way to recovery. But at this stage there are serious dangers. Non-formation of urine may cause the blood to be toxic and uræmia may set in. Again there may be high fever in the period of reaction as a result of accumulative toxins absorbed in the system. The patient, then although saved from collapse succumbs to uræmia or hyperpyrexia.

For the proper treatment of cholera we have not many things to choose. At the present state of our knowledge the physician has mostly a limited line of treatment to follow. Thirst has to be allayed first by sipping water, soda water or green cocoanut water. Small quantities of water need be repeatedly given although these may be immediately thrown out by vomiting. Small quantities at a time may remain for sometime within the stomach and a stay of every one minute means some absorption. Large quantities should not be given to be drunk at a time as this may induce vomiting. Ice may be given for sucking. This keeps down internal temperature and also keeps down tendency to vomit.

DISEASES OF THE DIGESTIVE ORGANS

In the matter of medicine we are left with simply one item, namely calomel. On the admission of the patient, if there is at all any pulse and collapse has not set in thoroughly, calomel is the only drug. We have to depend on calomel and calomel only. Calomel in $\frac{1}{4}$ grain doses every 15 minutes may be given for 2 or 3 hours till the colour of stools changes to green and then at greater intervals.

Calomel acts on the system as an antiseptic killing the cholera bacilli. But calomel also does the scavenging. It does not allow the dead bacilli to remain within the organs and create toxins. It helps the already formed toxins to be purged out. Cholera bacilli, somehow stop secretion of bile or destroy bile. On post mortem examination cholera bacilli have been found to be blocking the gall bladder in large numbers. Whatever be happening it is found that calomel kills the bacilli and makes the bile to flow. This is a great step forward towards recovery.

But calomel may not carry us very far. We have seen how the system becomes denuded of water and blood gets thickened thereby. If the blood is not made to return to normal fluidity, if the specific gravity of blood is not lowered to normal, then blood cannot discharge its functions nor can urine be formed if blood pressure is not raised. To bring all these about we have only one course to fall back upon. It is the introduction of fluid into blood by way of saline. That saline injection dilutes blood and raises blood pressure was known from a long time

TREATMENT OF CHOLERA SALINES

In fact, the physicians have known them at least these fifty years and used saline injections yet the death rate in cholera was near about 70 per cent. The patient got relief by injection but almost immediately after discharged the fluid by purging and vomiting. So, no lasting good could be affected. Physicians of those days injected normal saline or water containing 90 grains of common salt per pint of water. It was left to Doctor Rogers to discover that this was not enough. Dr. Rogers found that if he injected hypertonic saline or saline containing 120 grains of common salt per pint of water, marvellous and lasting results could be obtained. Dr. Rogers by his world renowned researches established many truths about saline and their effects and made wonderful discoveries which mark him as an epoch-maker in cholera treatment. Dr. Rogers commenced using hypertonic solution from 1908. Prior to that from 1895 to 1905 the treatment at Calcutta Medical College Hospital was with rectal and subcutaneous saline. During this period the death rate was 59 per cent there. In 1906 normal saline was being given intravenously. The death rate came down to 51.9 per cent. In 1907 the old treatment of rectal and subcutaneous saline was reverted to. The death rate flew up to 56.5 per cent again.

Now, in 1908—9 Dr. Rogers introduced hypertonic saline and the death rate came down to 32.6 per cent. In the subsequent year he further brought down the death rate to 23.3 per cent by internal administration.

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of pot. permanganate along with hypertonic saline. At the present moment however, permanganate is in disfavour and better results are obtained without it than with it. Treatment now consists of calomel by mouth and hypertonic intravenous saline injection. Dr. Rogers got corroborations of his findings later on by reports from Campbell Hospital. He writes, "During the first three months of 1910 my methods were not used at the Campbell Hospital and then cholera mortality was 71 per cent, the disease being of at best the average of somewhat over average severity. In the middle of April, hypertonic intravenous injections and very weak permanganate drinks were commenced at Campbell Hospital and during the next three months the mortality fell to 34 per cent against 64 in the same months of the previous year"

Salines in cholera have to be discriminately given. Saline can be given in three forms :

Subcutaneous, Rectal and Intravenous.

In subcutaneous injection a large quantity of fluid cannot be introduced and it requires sometime for absorption. Where every moment of delay hastens collapse, subcutaneous injection is not expected to be effective. If the circulation is very sluggish and blood pressure low, subcutaneous saline almost fails to act. There are other limitations of subcutaneous saline also. When some alkali as soda bicarb is necessary to be mixed with blood it cannot be given through subcutaneous injection. Only normal saline or 90 grains of sodium chloride per pint is permissible

SALINES

in subcutaneous injection Hypertonic saline and alkaline saline cannot be given subcutaneously for these solutions will cause gangrene of subcutaneous tissues with fatal results The use of subcutaneous saline gets therefore limited In very early cases of cholera, before collapse has set in, subcutaneous saline is of use It is useful for children The veins are of so narrow bore in children that intravenous injection is seldom possible Subcutaneous saline is also used in combination with intravenous saline When after an intravenous injection, a store of saline is necessary to be reserved in case of further evacuations, subcutaneous injection may be of value, the system drawing upon it when the quantity of fluid infused through the vein falls short of the demand

When blood pressure is low and when the pulse is not felt at the wrist, subcutaneous injection may not be helpful at all With sluggish circulation a store of saline may remain unabsorbed although the patient may die for want of fluid in the blood Another disadvantage with subcutaneous method is that sufficient quantity necessary at an emergency cannot be introduced through it Only 1 to $1\frac{1}{2}$ pints can be introduced subcutaneously whereas up to 4 pints may be necessary for a collapsed patient whose blood has thickened to high specific gravity But there are conditions when intravenous injection is not suitable such as cases where there are heart or lung complications or there is tympanites Then one has to fall back upon subcutaneous injection

DISEASES OF THE DIGESTIVE ORGANS

Rectal saline is sometimes of use for adults. Normal saline one pint with glucose one ounce may be given per rectum every four hours until urine is passed freely. For babies rectal saline may have to be given and may probably be found useful. Cholera however is rare in children.

Intravenous injection is the most useful form of injection. Hypertonic saline has 120 grains of sodium chloride to a pint of water along with 4 grains of calcium chloride. This strength of saline is called hypertonic and the introduction of this strength of saline has caused the death rate of cholera to fall so low. In intravenous transfusion hypertonic saline may be given. In addition some alkali may be introduced also along with it. In cases of extreme collapse, where the patient had no saline injection within 30 hours of attack, introduction of alkaline saline gives less chance for uræmia to develop.

The Salines are :

1. Normal Saline —

Sodium chloride	...	...	90 grains
Water	...	...	1 pint.

2. Hypertonic Saline —

Sodium chloride	...	...	120 grains
Calcium chloride	...	...	4 "
Water	...	...	1 pint

3 Normal saline with soda bicarb —

Sodium chloride	..	...	90 grains
Soda bicarb	...	...	60 ;
Water	...	...	1 pint.

SALINES

Soda bicarb should never be mixed with boiling water. Water containing soda bicarb should not be boiled for boiling or very hot water decomposes soda bicarb with formation of soda carbonate which is injurious and should not be introduced as saline. The proper way with soda bicarb solution is to make a cold solution of both sodium chloride and soda bicarb in water.

4 Alkaline Saline —

Sodium chloride	90 grains
Soda bicarb	... 160 ,,
Water . . .	... 1 pint

The solutions should be made with distilled water and should be perfectly sterilised by boiling and cooled before transfusion.

Before beginning transfusion, the following points should be attended to (1) condition of the patient, (2) temperature, (3) specific gravity of blood, (4) heart trouble, (5) blood pressure.

Cases needing immediate transfusion of intravenous saline show violent cramps of muscles. One need not wait for the state of collapse and cyanosis to come which follow the cramps quickly.

Temperature should be taken at the armpit and also at the rectum to obtain internal temperature. For want of circulation the surface temperature may be low while there is very high temperature within. Intravenous saline should be given at room temperature when the rectal temperature of the patient

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is below 100°F. Where the rectal temperature is higher, saline cooled by placing the bottle in cold water should be given. The higher the rectal temperature, the cooler should be the saline. Transfusion of saline brings in a reaction with rise of temperature. If the internal temperature is already high, the saline will raise it higher, causing hyperpyrexia. Very high temperature in cholera is extremely bad. Some cases succumb simply because of the high temperature. In others high temperature leads to severe uræmia which may end fatally. Temperature should therefore be kept down and transfusion should be made after having suitably cooled the saline so that even after the transfusion the temperature may fall down rather than rise. It would be very wrong to inject saline without giving proper attention to the temperature. In high rectal temperature in cholera, efforts should be made to bring down the temperature by cold sponging or even by wet pack.

Specific Gravity :— There are several methods of taking the specific gravity. The village practitioner, for whom this book is intended, may not have the appliances although they are quite simple. The simplest way is to keep stock solutions of glycerin and water of 1056, 1058, 1060, 1062 and 1064 specific gravities. These solutions are poured into small phials. A little blood is obtained by pricking the end of a pressed finger and the droplet of blood is quietly introduced into one of the test phials. If it floats then it has a lower specific gravity or if it sinks it has a

SPECIFIC GRAVITY OF BLOOD

higher. By a few trials it may be found that the droplet of blood remains in some glycerin solution, anywhere within. This shows equal specific gravity to the standard. This determination is necessary. When the blood is thick the case is for intravenous injection of saline. The character of thickness of the blood determines also the quantity of saline to be injected. Whereas if the blood is not thick, then transfusion of a large quantity of saline will further bring down its specific gravity leading to oedema in some one or other of the vital organs with fatal results. A specific gravity of 1064 or over requires 3 to 4 pints of saline, 1062 to 1064 requires 2 to 3 pints, 1060 to 1062 requires $1\frac{1}{2}$ to 2 pints; 1058 to 1060 requires 1 to $1\frac{1}{2}$ pints.

It may not be possible for all to keep an equipment for testing the specific gravity. In such cases simply the pressed finger-end may be pricked and a little blood squeezed out to test its character by its appearance. Such examination requires experience and may give fair indication of what is to be done. If the blood looks black, thick and semi-solid, the indication will be for immediate transfusion of saline.

The thicker the blood, the greater the risk of uræmia during the stage of reaction and the greater the urgency of alkaline intravenous saline. The quantity of saline to be introduced will largely be regulated by the thickness of blood. If it is thin only 2 pints may be enough, while up to 4 pints need be given if it is

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very thick. The condition of the heart has to be observed in connection with the introduction of saline. If during intravenous injection any lung or heart trouble is felt, if there is any uneasiness and the patient feels discomfort in the region of heart or lungs, intravenous injection should be stopped and subcutaneous injection given. Similarly intense headache may appear during intravenous injection. It should be stopped then and subcutaneous injection should be given. Blood pressure is another important item to be observed in a cholera patient. Generally a fall of blood pressure accompanies collapse. One great thing necessary then is to increase blood pressure by saline. If however the blood pressure is fairly high, then intravenous saline may not be given at all as it will tend to raise the blood pressure still higher. In such a case if the blood is thick, subcutaneous saline is to be given.

Weakness of Heart — The heart is to be kept toned up and aijun is a very valuable drug here, if at all the blood pressure is such as to permit of absorption of any drug taken by mouth. Subcutaneous injection of digitalin 1/100 grain may be given hypodermically. Hypodermic injection of atropine sulphate 1/100 grain morning and evening is very good in cases of feeble pulse. When after saline injection pulse does not show improvement, injection of atropine 1/100 grain is likely to prove satisfactory.

Uræmia — A patient who had collapse and has revived through one or more injections of saline may

URÆMIA

pass on to the reaction stage without mishap but during this stage there may be uræmia Uræmia is due to non-formation of urine If the patient remains in a collapsed and pulseless condition for a considerable time before saline injection, the risk of uræmia is great High rectal temperature in cholera also acts injuriously upon the system particularly on the kidneys which then fail to function and expose the patient to the risk of uræmia

If the patient has not passed urine in 24 hours, the condition should be considered grave With the setting in of uræmia, respiration becomes deeper and quicker and there is somewhat of a hissing sound in breathing The patient becomes apathetic, restless and irritable In early stages something can be done but in fully advanced cases of uræmia treatment is of little avail

Uræmia is generally accompanied by cessation of stools When a cholera patient ceases to pass stools, the physician should be watchful and apprehend uræmia To avert threatened uræmia one great measure is to open bowels by repeated one ounce doses of castor oil Purging commences and thereby the toxins get eliminated Alkaline intravenous saline also should be given freely

If there is a collapse by loss of fluid, on account of purging, the lost fluid may at once be made up by giving intravenous saline Castor oil should be given freely and without fear in order to avoid threatened uræmia

DISEASES OF THE DIGESTIVE ORGANS

Cupping on the back on the region of the kidneys and subsequent hot fomentation sometimes induce kidneys to act, which should be tried.

The following are salient points in connection with cholera treatment :

- (1) Begin with $\frac{1}{4}$ grain of calomel with 10 grains of soda bicarb to be given every half an hour. This alone may avert full development of choleric condition
- (2) Continue calomel if absorption is possible. But if pulse is feeble or imperceptible, then any medicine by mouth is worse than useless, for it is not absorbed and creates complications
- (3) Give saline if collapse is threatened. Choose whether intravenous hypertonic saline should be given or subcutaneous normal saline should be given
- (4) Continue to inject saline if there is continued loss of fluid and avert collapse. Combine subcutaneous with intravenous saline in extreme cases.
- (5) Prevent uræmia by keeping blood pressure high through alkaline saline and keep bowels open with castor oil. Depend on saline for making up lost fluid through purgation induced by castor oil

Opium in Cholera.— Opium at one time was thought to be useful in cholera. But it has now been definitely established that opium in cholera is

OPIUM AND KAOLIN IN CHOLERA

positively injurious It should not be given once cholera is developed In certain cases of diarrhoea, opium is useful but where cholera is suspected, it is better to administer calomel instead of opium Opium interferes with the action of the kidneys and makes recovery difficult by favouring uræmia

Kaolin in Cholera — Kaolin or China clay, is useful in cholera It has got excellent absorptive power and absorbs cholera toxins The next point after absorption is to throw off the absorbed toxins from the system This can be done by administering castor oil alternately with kaolin Where there is no possibility of saline injection being given, the patient should, as an alternative treatment, be given kaolin-castor oil.

Kaolin 2 ounces should be shaken up with 20 ounces of water and kept stored for use in 12 hours At first one ounce doses should be given every half an hour for four hours then every hour for three hours and then every 2 hours After the first two hours an ounce of castor oil should be given This may be repeated according to the severity of the case

Subcutaneous saline may be continued with the kaolin-castor oil treatment Where even kaolin is not available, dry clean clay sterilised by boiling in water and freed from sand by washing and settling should be used Clay is mixed thoroughly with water, stirred and the upper layer containing fine clay is poured away, grit and sand remaining behind The poured out portion is then settled to obtain pure clay

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Diet in Cholera:— Nothing but water need be given. When the acute stage is over, green cocoanut water and barley water may be given in very thin form. When the stool begins to form, whey should be given followed up by dahi beated up with water as the case progresses towards recovery. Next to this rice softened to semi-solid and mixed with dahi may be given. Of complications which arise in course of treating cholera, the following are frequent and are grave. They are

Hiccough, diarrhoea, dysentery, oral sepsis, pneumonia and enteritis

Hiccough.— It is a most troublesome complication arising generally on the third day of the attack. It may also begin later on. Generally hiccough is due to absorption of toxins. In all cases of hiccough fractional doses of $\frac{1}{4}$ grain of calomel and soda bicarb 10 grains up to 12 doses. Then a saline purgative may be given. If this fails at all, saturated solution of thymol in water along with chota chandra should be given.

Mustard plaster should be applied on the stomach as counter irritant and is useful. In some cases this poultice alone stops hiccough. It has to be retained for 15 to 20 minutes.

If all these fail to bring in any satisfactory result, morphine $\frac{1}{4}$ grain with atropine gr. 1/100 should be administered hypodermically.

Diarrhoea and Dysentery:—If diarrhoea occurs it should be checked immediately to avert subsequent

COMPLICATIONS OF CHOLERA

collapse. Kaolin drink is to be given freely Bismuth salicylate and opiates may be given in this state with good results Dysentery should be treated on lines indicated under

Oral Sepsis —As a general rule, it should be avoided by frequent washing of the mouth with some antiseptic lotion such as boro thymol alkali lotion or dilute pot permanganate lotion If the parotid glands become swollen, hot boric compress may be given and tinct iodine painted externally.

Intestinal Hæmorrhage —Though rare, it is one of the gravest complications As soon as the patient commences passing tarry stools or red stools, cold mud compress should be applied on the abdomen Starch enema containing 2 to 4 grains opium in barley water should be given twice daily, if required Opium with bismuth is very useful in this state The patient should be kept on whey water or green cocoanut water

Hæmaturia —Blood in urine in cholera is due to the irritation of the kidneys by comma bacilli If soda bicarb can be used freely from the very first, it can be avoided If this occurs as a complication give the patient enough of alkaline drink and cocoanut water Starch opium enema may be given

Prevention of Cholera —Cholera bacilli live in cold and in water In moist cloth they may remain alive for weeks But these bacilli die at 60°C and also under dry heat of sun The stools of patients, their bed clothes etc have to be disinfected In villages

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we shall have to fall back upon boiling as the only thing. Stools, urine and vomitus should be mixed with water, boiled vigorously and then put under earth. Similarly soiled clothes should be thoroughly boiled and dried in the sun. Care should be taken that no flies may have access to any discharges from the patient. Flies sitting on infected material and then sitting on food stuff contaminate them and cholera is propagated by taking such food.

Care on the other hand, should be taken to keep all food covered and the best way is to eat as soon as food is cooked without allowing flies to have a chance to contaminate. Nothing raw should be taken during an epidemic. Care should be taken to preserve the general health. Fatigue, chill, excess in diet and use of saline purgatives during an epidemic should be avoided.

Cholera bacilli cannot thrive in acid medium, in fact they are killed by acids. The acid in gastric juices kills cholera bacilli. It is therefore advisable not to remain in an empty stomach during an epidemic or while visiting a cholera patient.

Well water should be disinfected. Potass permanganate is useful for this purpose. Permanganate is likely to kill the bacilli. In addition to this, permanganate forms precipitate which carries with it the bacilli down and thereby keeps the top water free.

Vessels and utensils used for serving food should be washed with boiling water, for if they are washed

SERVICE DURING AN EPIDEMIC

as is usual with any water they may get contaminated from the very water used for washing them and thereby spread cholera although other precautions may be taken

Service During an Epidemic — Cholera spreads generally through contaminated water. Therefore closest attention should be paid to see that no contaminated water is used for any household purpose. It has been found that cholera spreads along the banks of rivers. It is not unusual for the dead body of a cholera patient being thrown into a river while soiled linen and beddings of the cholera patient are washed in tanks and rivers from which drinking water is taken. Unless sanitary sense of the affected people is roused, it is very nearly impossible to prevent the spread of an epidemic or to prevent unnecessary loss of lives. What a great toll we have to pay annually! During the early stages of epidemic 70 persons per 100 attacked used to die in hospitals. With the introduction of hypertonic intravenous saline injection, the death rate may be kept down, but how few may have the opportunity of treatment first with calomel, then with saline and then saved from uræmia by watchful injections of alkaline saline and purgation by castor oil. Still it is hoped that those who are interested in saving life during cholera epidemic should devise methods of prevention and for serving those affected and they should learn how to inject intravenous saline. The character of bacilli, the modes of spread of cholera and the methods of prevention should be widely

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made known so that every family in an affected area may protect itself. There is a terrible fear associated with cholera and naturally so. The patient dies so quickly and so little can ordinarily be done for him that it is regarded as a great scourge. It should be fought by disseminating knowledge about its prevention and where a case appears by taking all preventive measures for its spread and for treating the patient so that he may have a chance to recover.

Typhoid or Enteric Fever

Typhoid is a preventible water-borne or dust and dirt-borne disease. It is due to the action of bacillus typhosus on the human system. These bacilli on entering the body attack particularly the small intestine and exert a toxic influence generally on the body. In the intestines these bacilli create wounds which have the effect of thinning down the walls till at last the wall may yield by perforation.

These bacilli cannot withstand a temperature of 60°C . But at a lower temperature either moist or dry they can live for sometime outside the human body. The bacilli have been found to live in water for 8 days. Unlike cholera bacilli the typhoid bacilli can live in dry dust. They can therefore spread with infected dust carried by the wind. Typhoid may be communicated directly by contact with soiled linen or other articles of use of the patient. The evacuations

TYPHOID OR ENTERIC FEVER

may find their way to sources of water supply and contaminate them. When water is contaminated the spread of infection becomes easy. If such water is drunk then there is the gravest risk of infection. If utensils are washed with such water, the contamination takes place and any food put on these vessels gets contaminated. Milk may get contaminated in this way by being kept in vessels washed with contaminated water. Milk itself is a very favourable medium and typhoid bacilli coming in contact by chance with milk continue to grow and multiply. There are persons who are immune to typhoid. Typhoid bacilli are found in their stools. Such persons are carriers of typhoid and without being diseased themselves they serve to spread typhoid. The presence of such a carrier in a dairy is particularly fraught with danger. All the precautions of cholera have to be taken for prevention of typhoid also. Perhaps more precautions have to be taken, for cholera bacilli do not remain alive on drying whereas typhoid bacilli live even on drying. A prominent physician truly observes, "Typhoid bacilli do not naturally inhabit in water or milk, they may exist in these for a time and even multiply but their natural dwelling place is man and these are only carriers from one host to the next." So one has always to remember in handling typhoid cases that the field for reception of typhoid bacilli is present in attendants and neighbours and all those who may come in direct or indirect contact with the patient.

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After infection there is a period of incubation when the germs strive to multiply and produce characteristic effect on the host. The period of incubation is usually 10 to 14 days, although cases of incubation from 2 to 23 days are also found. When typhoid bacilli enter the human system they create a general feeling of lassitude. Headache, nausea, loss of appetite, pain in limbs, bronchitis are some of the symptoms of the incubation period. Then the disease exhibits itself in a rise of temperature.

The temperature rises and falls daily with regularity, the morning temperature being usually lower. There is a gradual rise of the temperature from day to day and step by step (ladder-like). During the first week the rise is generally up to 103°F. Pulse is from 100 to 120 per minute. The tongue gets coated with a yellowish fur but the tips and edges are very clear and have a characteristic redness. Diarrhoea may appear but in the first week there may be constipation also. During the first week red spots appear over the abdomen and the chest.

During second week the temperature remains high at 103° or 104°F. In the morning there is a remission. The patient becomes weak. There is a dullness perceived and abdominal troubles appear. Stools get foetid, diarrhoea becomes prominent. There is pain in the iliac region. The linings of the intestinal walls get corroded and thrown out with stools. Sometimes there is tympanites.

TYPHOID OR ENTERIC FEVER

During the third week the temperature comes down and remissions become marked in the mornings. Third week is the period particularly of debility and emaciation. Diarrhoea and tympanites may continue. This is the most critical period. Distressing symptoms may be aggravated and dangerous condition may prevail. There may be delirium, the tongue may be dry and brown, the heart may be weak. With aggravating distress the patient may succumb. On the other hand, there may be general subsidence of toxic effects.

During the fourth week or earlier, convalescence may commence. The tongue clears up, the temperature comes to normal. There is a risk of relapse in certain cases at this or in fact at any stage. If there is a relapse then the whole phase is again repeated with consequent greater debility on account of the lapse of time. In certain forms of typhoid the attack is insidious. There is slight fever and nothing seems to be particularly wrong. All on a sudden, very violent symptoms appear often with fatal results.

In a malarious area, any fever is at first apt to be regarded as a malarial fever unless some characteristic symptoms reveal that it is other than malarial fever. But one has to be careful in dealing with fever cases. A case may turn out to be one of typhoid after days of treatment as malarial fever. In case where it is not possible to definitely diagnose as one of malaria, simple fevers should be treated as cases of prospective typhoid. By such treatment nothing

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wrong can happen, whereas a good deal may be gained. In fact, the method of treatment need be such that whether it be a case of malaria or of typhoid, the general directions would be the same. Any solid food or food difficult to digest will put very additional risk in case of typhoid fever whereas it is harmful in ordinary fevers as well.

Treatment of typhoid consists in leaving the patient as far as possible to nature only attending to two things Counteracting the activity of the bacilli and maintenance of the strength of the patient.

For the first object disinfectants have to be given and for the second the strength has to be conserved in spite of practical starvation. In cholera infection there is no question of maintaining the strength of the patient. There the acute stage is short and in a few days the case is decided either way. But in typhoid the patient has at once to be prepared for 4 weeks' confinement to bed and that without practically any food. As we have already seen, typhoid is an infective fever, the seat of infection of which is the intestines. The whole set of abdominal organs get upset by typhoid toxins and it is then idle to expect these organs to deal properly with food material or to manufacture blood from any food that may be presented to them. On the contrary, any food that cannot be tackled by the weakened and infected organs, remains in the stomach and intestines as a load and produces further unhealthy condition and aggravates distress. We shall deal with this point in connection with diet in typhoid.

TREATMENT OF TYPHOID FEVER

Medical treatment should be directed towards keeping the intestines free from toxins and maintaining an antiseptic condition. Low pressure enema by means of a douche should be given daily to wash out the intestines. Instead of using a short nozzle, a No. 10 rubber catheter should be introduced as far as it can conveniently go. If the pressure is maintained low and water introduced very gradually, then ordinarily there will be little risk of injuring the ulcerated surfaces.

Antiseptics and disinfectants should be given by the mouth. The best thing to do is to give calomel in $\frac{1}{4}$ grain doses every half an hour. 4 to 6 doses should be given on the first day of diagnosis. This is to be repeated day after day observing the condition of the patient. This will not only help disinfection of the intestines but will also help expulsion of the toxins that may be generated by the action of bacilli.

With regard to the use of calomel, one fact must be prominently borne in mind that calomel changes into corrosive sublimate in the stomach and therefore may exert injurious action when that intestine is ulcerated. Calomel therefore should be used only when the case is taken up at the onset and should not be used after the first 6 or 7 days of the disease.

Quinine is recommended as very useful for preventing toxin formation. The condition of the patient should however be such as to tolerate small say, 2 grains doses of quinine or cinchona. For ulceration, bismuth carbonate may be given. Thymol

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and garlic have their use and water containing a smell of thymol by solution of boro thymol tablet may be given with advantage

Further the patient is to be helped to kill the toxins by introduction of iodine intravenously. Iodine injection once or twice a week has remarkable effect in typhoid and should be given, wherever possible. As the patient is to be kept in fit condition for a long period, much depends upon the state of the heart. Everything should be done to keep the heart strong. A daily dose of 5 tablets of arjun as a routine treatment should be adopted. Digitalis may be given in place of arjun. Garlic should be given, if tolerated. For the rest the treatment should be symptomatic. If there is delirious condition pot bromide should be given as a sedative. It should also be remembered that beyond the routine treatment of calomel, iodine, arjun, garlic or thymol, the less the medicines, the better.

The patient should be given a warm sponging once or twice daily. The mouth should be kept clean by gargling often with boro thymol alkali tablet. Plenty of water should be given which ought to be 80 ounces per day inclusive of any fluid diet that may be given. Complete rest should be given. Slight movements do positive harm to the ulcerated surfaces of the intestines, more than can be gauged from outside. Relatives of the patient may desire removal of the patient from one locality to another for convenience of nursing. But it is to be remembered that in

COMPLICATIONS OF TYPHOID FEVER

typhoid there may be the thinnest wall of the ulcerated intestine intervening between life and death and any jerk may prove fatal

Hæmorrhage. — The ulcerated surfaces may bleed It is a serious symptom and all attempts must be made to arrest it The most imperative thing is to give the bowels absolute rest A starch enema containing 1 to 2 grains of opium in solution should be given in serious cases to stop hæmorrhage at once A few drops of turpentine taken with water will act both as an antiseptic and a styptic To induce quick coagulation of blood calcium lactate in 15 to 20 grains doses may be given thrice daily Alkaline drink made by soda bicarb, glucose and water 1 pint may be given to every typhoid patient from the very onset

Perforation — Should the ulcers so far eat away the wall of the intestine as to make a perforation then the prognosis is very bad indeed There is sudden and severe pain, collapse and fall of temperature Operative measures are necessary If operation is not practicable, opium should be given hypodermically to alleviate suffering

Diarrhoea — In order to combat diarrhoea in earliest stages of typhoid nothing need be done except giving fractional doses of calomel which is the routine course of medicinal treatment even if there is no pronounced diarrhoea But if the stool becomes thin it should be treated on the lines as indicated under diarrhoea Bismuth salicylate should be given to

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make a coating and a little opium will be found extremely useful.

Bed-sores may be largely prevented by careful nursing. The parts should be lightly rubbed with soap water, then with methylated spirit and finally dusted with boric powder. Soft pads should be used to remove pressure from places where the skin may be weak.

During convalescence particular care should be taken to continue to give liquid food up to 10 or 12 days after the temperature has become normal. It is difficult to deal with the call of hunger of a convalescent typhoid patient. But the difficult thing has to be done. If any solid food is given earlier, the thinned intestinal wall may perforate with fatal consequence. Then again toxin may be produced by food indicated by a rise of temperature and a relapse may be induced.

Often the patient while progressing towards recovery shows dangerous weakness of the heart. It is necessary then to strengthen the heart by intravenous injection of 5 to 10 c.c. of 12½% glucose solution. Many a life has been saved by repeated and timely injection of glucose intravenously. Complication of pneumonia should be treated on its own line, care being given to the condition of the intestines. Melæna (blood in stools), haematuria (blood in urine) should never be neglected in typhoid and treatment should be on the line as indicated under cholera for these complications.

TREATMENT OF TYPHOID FEVER

Temperature — High temperature in typhoid is bad. It should be brought down. If sponging is not enough, wet pack should be applied to bring down the temperature. Wherever possible, ice bag should be applied on the neck where the spinal column begins and also on the head. If there is headache or other troubles in the head, ice bag is to be very watchfully applied to retard unfavourable development. Ice bag may be continued for an hour or so, then a brief interval is to be given and again applied. At a temperature of 103°F or above ice bag is a necessity. The head should be shaved for giving ice a closer touch with the surface. Where ice bag is not available, the hair should be shaved off and cold water applied as often as possible taking care not to let any water wet the patient's pillows or bed linen.

Oil Cloth — Oil cloth is to be used wherever possible covering the entire length of bed. A thick sheet should be put over it so that the oil cloth may not come in direct contact with the skin.

Cleaning — The mouth should be cleaned once or more often during the day. The gums are to be rubbed to ensure proper cleaning and to excite circulation so that the breath may not be foul. The nails should be cut, fingers and hands kept quite clean. After every passing of stool the part should be rubbed off with a piece of soft rag. Care should be taken to see that no offensive material remains adhered to the skin. The rags etc should be deposited in covered receptacles, disinfected and buried.

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Diet :—Nothing but liquid food should be given. But even in liquid food there should be little food. The ideal diet is whey. Milk is bad. It will form clots which will cause irritation and these are likely to pass unchanged. Dahi thinned down is a good diet only if the patient is able to bear it. Dahi is both a medicine and a food. The bacteria of the dahi are helpful for recovery. If dahi is not tolerated we are left only with whey. Barley water if given should be very dilute so that it may act more as an emollient than as a food. Green cocoanut water is an invaluable drink. It soothes the system, provides vitamin so that the resisting capacity of the patient is largely increased and yet has little or no food value.

CHAPTER—XII

DISEASES OF THE LIVER AND KIDNEYS

Management of the Liver Diseases

Generally speaking, the diseased liver primarily means defective secretion of bile. So in every case of hepatic disorder the first matter of importance is to promote the normal secretion of bile. The matter of portal circulation also should have to be kept in view. To help the portal circulation, intestines specially the lower part have got to be kept relieved, if necessary by occasional saline aperients. The commonest diseases of the liver we often meet with are gall-stones, jaundice, congestion of the liver, inflammation of the liver and liver abscess. If we go into the details of the origin of these diseases we can be sure of the fact that the general line of treatment is almost same in all these diseases.

The choice of medicines for these diseases is therefore a comparatively simple matter. Cheap drugs for combating liver diseases are as under:

Emetine Hydrochlor — It is the active principle of ipecacuanha and is used in the form of intramuscular injection in $\frac{1}{2}$ to 1 grain doses in adults. It is an unique remedy for amœbic dysentery, jaundice, periodical treatment of gall-stones and any sort of liver

DISEASES OF THE LIVER AND KIDNEYS

congestion. Emetine should not be given in weak heart. If administered on alternate days then an interval for a week should be given after 6 injections.

Bismuth salicylate increases the quantity as well as the fluidity of the bile and hence can be given in all cases of hepatic troubles. It is also a disinfectant to septic gall bladder.

The action of calomel as purgative lies in increasing the secretion of bile. Moreover, it is of great benefit in checking vomiting when administered in small fractional doses. In all chronic hepatitis and catarrhal jaundice it has a great place of importance.

Kalmegh is an indigenous specific for liver troubles. It is effectively used in all cases of liver complaints. In all liver complaints of children and specially in icterus neonatorum its action is wonderful. Apart from its curative values, it is also a healthful tonic for the liver.

Gall-Stones

Gall-stones are stone-like concretions in the gall-bladder. They may vary greatly in size. Some may be like sands or gravels quite a large number of them being present. Others may be bigger in size, while single gall-stones filling the entire cavity of the gall-bladder have been found. Stones so big in size are found that by adhesion of the wall of the intestine with that of the gall bladder, the stones may work their way into the intestines and once there, may

GALL-STONES

cause intestinal obstruction requiring surgical operation

These concretions are of substances called cholesterin and the bile pigment or bilirubin. They may be soft, moderately soft or very hard. It is the harder varieties that give most trouble. When a number of concretions are present, the gravels or stones develop facets on account of impact or the rubbing action of one on another. When they are singly present they develop like nodules with rounded edges.

The root cause of formation of these stones is some sort of catarrhal infection of the gall bladder which causes sluggish flow or thickening of the bile. Indirectly anything causing thickening of bile or sluggish formation or flow of bile will induce formation of gall-stones.

Sex and age are factors which predispose towards their formation. Gall-stones are four times commoner in women than in men. Then again it is a disease of old age, persons between fifty and sixty being most frequently attacked. Nervous men and women are more prone to attack. Then again those who take too much of proteins, tax the gall bladder too much. This may induce formation of stones. Sedentary habits, tight lacing, want of exercise, longer intervals between meals all may help causing sluggish flow or thickening of bile and thence formation of stones. A gouty tendency also is helpful in development of gall-stones.

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Then again heredity plays a part. Dyspepsia, habitual constipation may be regarded as contributory causes. Heart disease, liver disease, the blocking of the entrance of the gall bladder by round worms, catarrh in the bile duct and malignant diseases induce formation of gall-stones

Small gall-stones may be present in the gall bladder without causing any inconvenience or producing any symptoms of discomfort. But generally as a precursor to colic the following symptoms may be observed. After meals there is a feeling of fullness and weight in the stomach which seems to be distended. This is relieved by belching and very great relief is secured by vomiting. It is then uniformly observed that a greasy diet promotes the conditions. With the progress of disease acute pain appears and is characterised by a tendency to fold the thigh on the abdomen. Pressure relieves the pain. The reason of the feeling of pain is the impact of the stones on the walls of the cystic or the common bile duct. The membrane covering the duct is very sensitive and the impact or friction of stones sets up very acute pain. Irritation of the impact causes the duct to constrict which then gets more injury from the presence of the stone. So that sensitiveness causes the pain and then again aggravates it. The region of the right hypochondrium is affected, the liver is enlarged and tender and abdominal muscles are contracted and the pain shoots upwards to the right shoulder and back. The colic

TREATMENT OF GALL-STONES

due to obstruction of flow of bile is called hepatic or biliary colic

During a paroxysm of attack, the pulse becomes small, the face is pinched and cold perspiration appears on the forehead. There is great distress and restlessness. Temperature rises up to 102° or 103°F. Vomiting often accompanies an attack.

The pain continues till the stone passes out of the duct to the small intestine or slips back to the bladder. The passing off of the stone from the duct is followed by quick relief. If the obstruction is prolonged, jaundice may appear and with increasing obstruction there may be intense jaundice. The usual symptoms of bile obstruction follow. The stools become white or slate-coloured and foetid. Toxæmia may appear.

Treatment may be divided into two stages namely, during paroxysm and after relief of pain. During paroxysm the first attempt should be to make the patient vomit by giving large quantity of saline water. The act of vomiting brings in relaxation of the irritated and tightened duct. It is easier then for the calculus to pass down the duct into the intestine. Boric fomentation on the region of the liver and hot poultices are useful in relieving pain. Turpentine may be given in 5 minims doses which may help expulsion. Large quantity of warm alkaline water also does good by making the bile fluid and making it flow copiously so as to wash down the obstruction. Bismuth salicylate is an ideal medicine for our purpose in as much as it is an active cholagogue.

DISEASES OF THE LIVER AND KIDNEYS

and also an antiseptic Soda bicarb 60 grains and bismuth salicylate 20 grains dissolved in a pint of hot water should be given as often as possible in mouthfuls. Soda salicylate in 15 grains, three times a day with soda bicarb 15 grains is very useful by rendering the bile more fluid and acting as an antiseptic.

But these and other remedies may fail to alleviate the distress of biliary colic. Then anaesthesia is the thing for the purpose of relaxation. Opium acts wonderfully here. It produces anaesthesia making the irritated and injured duct to yield and make a passage and the patient also becomes insensible to pains. Generally after a dose or two of 2 grains of opium the patient recovers from the attack. Opium may be objected to as arresting the flow of bile. It is true that opium arrests the flow. It has to be corrected by giving copious alkaline drink. Nothing acts so quickly and powerfully as opium. If the patient cannot tolerate opium by mouth then morphine hydrochlor $\frac{1}{8}$ to $\frac{1}{4}$ grain may be injected hypodermically.

After the passing off of the attack of pain there still remains the danger of another stone coming and blocking the duct as before. Or there may be formation of another or more calculi if it was emptied of them. We have no known method of dissolving the calculus within the gall bladder. If the obstructive material is already present then the most rational course would be to let it pass down naturally.

TREATMENT OF GALL-STONES

and face the trouble only helping it to do so with as little injury as possible by keeping the flow of bile copious and its consistency thin All the circumstances that go towards thickening bile and arresting its flow should be attended to and habits corrected and plenty of alkaline water taken Calomel in $\frac{1}{2}$ grain doses is an ideal thing for minimising chance of repeated attacks

When there is no more calculi, their further formation should be prevented by having recourse to the very same methods enumerated above Emetine hydrochloride should be injected in $\frac{1}{2}$ to 1 grain doses in 1 cc on alternate days up to 6 injections Plenty of water to drink, calomel as aperient followed by magnesium sulphate 2 drams doses to throw off calomel and also for increasing flow of bile, hot alkaline water consisting of soda bicarb and salicylates, kalmegh and punarnava as corrective of liver troubles are indicated.

In biliary calculus it is necessary to decrease the amount of starch and take more of protein food, but too much protein food causes the formation of gall-stones Fruits are excellent as food, specially juicy fruits

Massage of the whole body, sun bath and water baths should be taken and presence of all the necessary vitamins in the food should be ensured to create a healthy condition of the entire system Moderate exercise should be taken regularly

When there are repeated severe attacks of biliary colic, medicines, regulation of diet and other measures

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do no good, when jaundice is severe, when there are signs of suppuration then surgical interference is indicated. The surgeon may have to open up the gall bladder and remove the stones or if the injury has advanced far, more serious steps may have to be taken.

Prescriptions .

Emetine injection— $\frac{1}{2}$ gr. per dose on alternate days up to 3 gis.

Bismuth salicylate—10 grains

Soda bicarbonate — 20 „

Mag. sulphate — 1 dram

Per dose 3 to 4 doses daily in paroxysm and after relief of pain.

Soda salicylate—15 grains

Soda bicarb — 15 „

One dose 3 or 4 doses daily for antiseptic and cholagogue action

Calomel — $\frac{1}{4}$ gr

Soda bicarb—5 „

One dose. 8 doses at an hour's interval during paroxysm.

Kalmegh — 15 grains

Punaarnava—15 „

One dose 4 times a day, as soon as the acute state is warded off.

Jaundice

Jaundice is due to the absorption of bile pigment in the blood which exhibits itself in giving

JAUNDICE

characteristic yellow colour to the skin and the eyes. Jaundice is a symptom and arises out of obstruction of the flow of bile into the gall bladder or from the gall bladder into the small intestine. This obstruction to the flow of bile whether within the bile ducts of the liver or in the outlet of the gall bladder may be due to simple and remediable causes or it may be due to certain diseases which are not amenable to any treatment. The simple fact of having jaundice therefore, does not tell us much. The causes have to be enquired into.

Jaundice which is due to obstruction in the internal channels of the liver, is generally of toxic origin and is met with in septicæmia, malaria, typhoid, pernicious anaemia and in certain kinds of poisoning including snake-bite. Commonly jaundice due to obstruction of flow of bile from the gall bladder into the intestine may be caused by the presence of gall-stones in the bile ducts. The stones may directly obstruct the flow and cause jaundice. On the other hand, the stones may ulcerate the duct and cause colic and yet leave room for flow of bile without inducing jaundice. Again the bile duct may be obstructed or obliterated by scarring of an ulcer or there may be constriction of the duct due to pressure of other organs or due to growths or polypus. Depressing emotions may cause jaundice by interference with the flow of bile. Some simple disturbances such as that of chill or dyspepsia may also induce jaundice.

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In addition to the yellowness of the skin sometimes itching appears as a symptom. Urine and sweat are sometimes coloured yellow. Faeces become pale drab or clay-coloured and fetid. Languor, sleepiness and depression of spirit are observed. In extreme stages convulsion, delirium and coma may terminate life.

Treatment should be directed towards removing the causes. Generally speaking, the treatment indicated for gall-stones is also applicable to jaundice. Bowels are to be kept moved by aperients like myrobalan or mag. sulph and antiseptic cholagogues like calomel, salicylates, thymol and garlic should be given. Kalmegh which is a very effective cholagogue should not be missed. Vitamin C deficiency may somehow react on the absorption of bile and juice of green leaves of *arakar* plant (leguminosæ) is found to be very efficacious in simple jaundice without serious complications. Even in serious cases the juice of these leaves tends to minimise the yellowness of the skin and the eyes.

Alkaline drinks containing soda bicarb and soda salicylate are very useful. Plenty of warm water should be given. Milk diluted with warm water or whey may be given. Constipation must be seriously combated. If aperients are not enough then the bowels should be kept moved by daily wash-out with the help of douche. Syphilis may injure the liver and cause jaundice. In such case treatment as with bismuth, pot. iodide and mercury for syphilis should be adopted.

TREATMENT OF JAUNDICE

The putrefactive changes that are likely to occur due to absence of bile in the intestines should be counteracted by antiseptics. A tablet of creosote containing one minim of it or a few tablets of thymol may be given daily. Garlic is excellent for those who can tolerate it. Calomel of course has its own value as an intestinal antiseptic. For prevention of itching due to toxic condition of blood, warm baths containing some soda bicarb or boric acid should be given. The skin should be rubbed with some friction during the bath in order to get the best results of an alkaline bath.

General health should be improved. Light diet containing very little undigestible material should be preferred. Sun bath, water bath and massage should be regularly given. Light exercise when practicable, will be helpful in rousing the kidneys and the skin to action.

In case of obstructive jaundice from organic stricture of the duct or from pressure from tumours and in jaundice accompanied by ascites, the remedies suggested are only palliative. For chronic obstruction of the bile duct, surgical aid should be obtained.

Some children are born with jaundice. This condition is known as jaundice of the new-born. There is a benign form which the children get over without treatment. Calomel in 1/20th grain dose with 2 or 3 grains of soda bicarb twice or thrice daily will hasten cure. There is a grave form which may be congenital or which may be due to infection through

DISEASES OF THE LIVER AND KIDNEYS

the umbilicus. The treatment should be towards getting rid of sepsis.

Prescriptions :

Calomel— $\frac{1}{4}$ grain

Soda bicarb—10 grains

One dose three or four times daily for antiseptic and aperient action.

Kalmegh—15 grains or 3 tablets

Punarnava—10 grains or 2 tablets

One dose. twice daily. In combination with calomel and soda bicarb for increasing flow of bile

Soda bicarb — 10 grains

Soda salicylas—10 grains

One dose, thrice daily. For antiseptic and alkaline action.

Myrobalans—1 fruit or 3 tablets

One dose, twice or thrice daily for aperient action

Magnesium sulphate—2 drams

One dose, twice or thrice daily for flow of bile and aperient action.

Emetine hydrochlor— $\frac{1}{2}$ grain for intramuscular injection per dose. Repeat with intervals.

Congestion of the Liver

Generally when the proper functioning of the liver is disturbed, it may be vaguely attributed to congestion of the liver. Although the term is often vaguely and

CONGESTION OF THE LIVER

indiscriminately used yet it would be a mistake to ignore a real congestion of the liver

Congestion of the liver is accumulation of abnormal quantity of blood in the liver. There is normally a fluctuation in the quantity of blood in the liver. After each meal there is a transient congestion which is gradually relieved. Habitual excessive indulgence in food and drink intensifies the period of accumulation giving rise to active congestion. Habitual drinking of alcohol causes congestion. Recurring congestion leads to dilatation of the blood vessels. Exposure to cold and dysentery are associated with congestion of the liver. In malaria, kala-azar and dysentery, amoebic infection may affect the liver and cause congestion. In fact, amoebic infection in the first hand may cause liver congestion without even producing dysentery. Proneness to gout induces liver congestion. Abnormal condition of the stomach may produce toxins which reach the liver and may cause congestion. The suppression of menstrual flow also accounts for congestion.

Congestion in mild form is indicated by a feeling of unusual chill after taking meals. There is a sense of fullness and weight and tenderness in the region of the liver. There is also pain about the right shoulder. Symptoms of gastric catarrh, flatulence and loss of appetite appear. The tongue gets coated and the faeces get pale-coloured. These symptoms are sometimes spoken of as torpor of the liver and in milder form it is simply known as biliousness.

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In such cases the line of treatment is clear. The stomach should not be loaded with unnecessary or indigestible materials. Rest, unirritating food and occasionally counter irritants on the region of the liver and administration of alkaline drinks are likely to bring back normal condition. Counter irritant on the liver in the form of hot linseed poultice or mustard plaster is useful. Iodine may be painted on the liver daily till the skin is tender. Intravenous injection of iodine 1 cc, calomel in $\frac{1}{4}$ grain doses three or four times a day associated with soda bicarb and other mild aperients like myrobalans and magnesium sulphate in small doses are very useful curative. Kalmegh is also indicated in improving the condition of the liver. When these measures do not give response, kurchi should be given by mouth or emetine hydrochlor intramuscularly.

In chronic cases the patient should be given light exercise in order to make the abdominal organs function properly. The diet should be restricted in quantity. A little milk or soft rice with milk should be given for several days. Exposure to chill should be avoided. Counter irritants in the liver will be useful in chronic cases also. If the way of living is one of indolence then sufficient exercise should be taken to rid the system of accumulated toxins.

There is another or passive form of congestion of the liver brought on by morbid condition of the heart and lungs or other diseases on account of which there is a sluggish flow of blood. In such a state a

INFLAMMATION OF THE LIVER

slight obstruction in the liver is with difficulty overcome leading to congestion of blood or engorgement of the liver. The liver in this case may enlarge very greatly extending even up to the navel or even further down. In such cases a host of other dangerous symptoms appear such as gastric or intestinal catarrh, ascites or general dropsy. Urine becomes scanty and bile-coloured. Free purgation and cardiac tonics like arjun and digitalis will do whatever can be done. The food should be regulated keeping in view the morbid condition of practically the whole of visceral organs. Hot boric fomentations may give some relief.

Prescriptions as in jaundice.

Inflammation of the Liver

In its typical form the disease consists in the degeneration of the liver cells and overgrowth of connective tissues of the liver. These growths obstruct portal circulation through the liver and destroy liver cells bringing in serious consequences. This stage may result from repeated attacks of congestion as in malaria or it may come in so insidiously that nothing is observed before mischief is done.

As with most other diseases of the liver, here also in the beginning there is a sensation of fullness or weight on the right side as if a lump has been there. There may be occasional shooting-pains extending up to the right shoulder, nausea, vomiting, flatulence,

DISEASES OF THE LIVER AND KIDNEYS

dyspepsia and loss of appetite are but stages only. Instead of disappearing as in the case of temporary congestion, these symptoms become permanent. The liver becomes enlarged in earlier stages and then becomes stiff and shrinks. If the disease is brought on by free use of alcohol, the liver gets smaller and the condition is known as atrophy of the liver. The stools also take the characteristic clay colour indicating absence of bile while the urine gets highly coloured. Sometimes jaundice sets in. In the later stages of inflamed liver the disease is known as cirrhosis or hardening of the liver due to fibrous growth. The liver then ceases to function properly giving rise to a set of symptoms already indicated. Sometimes syphilis will affect the liver and bring in atrophy. Here specific treatment of syphilis will be necessary.

Treatment is the same as in the case of jaundice or gall-stones. The bowels are to be kept moved by the use of aperients. Alcoholic drinks should be avoided. Habits of living should be changed for better and more healthful ones. Exercise should be taken. Remedies indicated for jaundice should be tried so far as the symptoms agree.

In all cases of hepatic congestion or inflammation of the liver or jaundice, hot fomentation with cow's urine is a time-honoured custom in villages. This method, though seems to be very antique and crude in form, is effective in combating the liver complaints in general.

LIVER ABSCESS

Liver Abscess

Abscesses of the liver are generally multiple. In exceptional cases only single large abscess may be met with. The abscesses are always due to infection from sepsis. They are particularly present in pyæmia due to diseases like dysentery, gastric ulcer, pyorrhœa, gall-stones, appendicitis etc. It is frequently associated with amoebic dysentery.

The liver abscesses are generally accompanied by fever of an irregular and septic type. There are pain and tenderness about the liver and also liver enlargement.

The treatment is mainly surgical but in cases due to amoebic attack injection of emetine hydrochlor in early stages does good. Should the abscesses suppurate and rupture, the results are likely to be disastrous. The aid of a surgeon should be taken whenever a case is definitely diagnosed as being of liver abscess.

A course of emetine treatment by injections of $\frac{1}{2}$ grain doses continued over long periods with intervals of respite for a week after 6 injections, shows remarkable effects in many cases. Alkaline drinks, myrobalans, calomel, mag sulph, punarnava should be given according to symptoms as in the case of jaundice.

Cold mud poultice over the right hypochondrium should be tried.

URINARY AND RENAL DISEASES

Examination of Urine

The quantity of urine passed during a day by a healthy person is about 50 ounces varying with the amount of fluids taken. Females secrete a little less urine. With the increase of perspiration the quantity of urine diminishes and in cold weather when there is less loss of fluid through invisible perspiration the quantity increases. In diabetes and hysteria the quantity of urine is increased. In fever, in inflammation of the kidneys and in albuminuria, the quantity of urine becomes scanty. Urine is not formed or is suppressed in collapse and in cholera. The number of times one has to pass urine depends upon health. In certain diseases like enlargement of the prostate at the mouth of the bladder, in gravel, stone, in irritable bladder, in inflammation of the bladder and the kidneys, urine has to be passed more frequently.

Normal urine is of pale straw colour with a peculiar aromatic smell. It is generally clear but even in health urine may contain a slight quantity of mucus and may deposit some salts on cooling which are kept dissolved when the urine is at body temperature within the bladder. With affections of the kidneys and bladder the amount of mucus increases. The colour of urine is changed and becomes deeper on taking less water or on account of loss of abnormal quantities of fluid through the skin. The colour turns smoky or pink or red on admixture with blood which may get

EXAMINATION OF URINE

mixed with urine in the bladder or during flow Presence of blood in urine is called hæmaturia and may be the result of various causes Ulceration, stone or tumour may cause bleeding In certain kind of malarial fever blood gets into the urine Cloudy appearance of urine indicates deposits which may be urates and uric acid or oxalates or phosphates When the deposits are due to uric acid or urates the disease is called gravel When there are oxalates of calcium present in the deposits the disease is called oxaluria Similarly phosphaturia and albuminuria are names for diseases in which the urine containingp phosphates and albumin

Healthy urine throws off deposits on standing and the odour becomes foul on keeping on account of decomposition The specific gravity of urine is anything between 1015 and 1025 It may be as high as 1035 even in health The specific gravity decreases with the quantity of water intake In health the specific gravity varies with the amount of urea and chlorides present Normal urine is slightly acid If urine is decomposed, it becomes alkaline

Prevention is the greatest thing in urinary diseases Once the kidneys are injured, it is difficult to repair them For this purpose the quantity and specially the specific gravity of urine should receive attention The flow of urine should be maintained by taking proper quantity of water Punarnava is a good diuretic Its aid should be taken in all these urinary troubles when mere drinking of water does not help

DISEASES OF THE LIVER AND KIDNEYS

Urine is faintly acid. If it is distinctly acid, it would have to be corrected. In fever and in lithiasis it is distinctly acid. Alkali in the form of soda bicarb is to be given. Sodium citrate is found to be more efficacious than soda bicarb. Sodium citrate is made by neutralising lemon juice with soda bicarb. Wherever possible, some soda bicarb may be neutralised and taken in addition to the usual dose of soda bicarb.

When however trouble arises in the form of renal colic, the treatment for colic as in biliary colic is indicated. Applications of warmth, hot poultices, hot bath, alkaline drinks and lastly opium have to be administered while the flow of urine is to be kept up by punarnava.

Lithiasis

Lithiasis is the deposition of uric acid and urates in the urinary passages. Uric acid is insoluble in water whereas urates are soluble. Water tends to decompose the urates but there is some inhibitory action in normal urine preventing precipitation of uric acid. The breaking up however does take place and urine containing the deposits is passed in abnormal health. The deposits contain also some pigment matter and are therefore coloured.

When food contains too little of mineral salts then deposition of uric acid may take place. Some of these deposits may remain in the bladder and form stones. Uric acid cannot be deposited from an alkaline urine.

LITHIASIS OXALURIA

and cannot be deposited within the urinary passages. The deposits of urates can be recognised from the fact that they disappear on heating the urine. If albumin also is present in urine then it may coagulate by sudden heating and may interfere with correct observation.

Protective measures against deposition of urates would be to lessen the acidity of the urine and to increase its dilution. Diet and exercise should be regulated, more saline substances and vegetables should be given. As a protective soda bicarb in 30 grains doses may be given morning and evening. Longer interval between meals predisposes the formation of uric acid gravels. Food should be therefore given more frequently. Plenty of warm water should be taken. A gouty diathesis also is inducive of lithiasis. Warm baths, keeping of bowels freely moved, avoidance of excess of food are the preventive measures.

The excretory functions of the skin should be promoted by massage and baths.

When uric acid or other deposits form within the kidneys or the bladder, they give rise to renal calculus or renal sand or gravel.

Oxaluria

Frequently crystals of oxalate of lime are found with the urine. They are transparent, colourless and octahedral diamond-like crystals. Sometimes they

DISEASES OF THE LIVER AND KIDNEYS

are of dum-bell form. In health a little quantity is daily passed with the urine. But when these crystals are deposited in the urinary passages and are not thrown out with the current of urine, they create mischief and give rise to renal calculi. The oxalates are kept in solution by the acid sodium phosphate present in urine. But every one urine out of three contains crystals of oxalates due to absence of sufficient acid sodium phosphate to keep them dissolved. Their presence does not indicate that this constituent of urine is being passed in excess of normal. These deposits are increased by taking vegetables. In dyspepsia the quantity is augmented. Their presence combined with languor may indicate that the health may be below normal. Exercise, good food and improvement of general health will go towards making the necessary correction.

Phosphaturia

Phosphates are excreted with the urine normally, but they may get precipitated before leaving the system. The phosphates cause a white deposit in neutral or alkaline urine. Such deposit is common in health. One kind of phosphates is prone to make concretions and forms calculi. Stagnation of urine in the bladder may favour their formation. Phosphatic deposits get dissolved on heating the urine with a little acetic acid. In order to prevent deposition within the bladder, attempts should be made to

PHOSPHATURIA • RENAL COLIC

thoroughly empty the bladder and not to let urine stagnate and decompose Boric acid 8 to 10 grains by mouth is said to be very efficacious in preventing phosphatic deposits in the bladder The bladder may be occasionally washed out with a warm solution of boric acid Punarnava is an excellent drug for increasing the flow of urine which is general method of combating lithiasis, oxaluria and phosphaturia

Renal Colic

The danger from abnormal urine is of its depositing precipitates before being discharged out of the system If they are thrown down on the pelvis of the kidney or in urinary passages, concretions may form. These concretions may occur in various forms They may be very small gritty particles or they may be of the size of coarse grains They are called renal sands or gravels They may be passed with urine without any symptoms or with just a little smarting during micturition But larger concretions also form of varying sizes and some of them may remain arrested on the pelvis of the kidney and cause serious trouble It may so happen that some of the larger pieces on leaving the kidney enter the ureter and there impact against the wall of the duct causing intense pain known as renal colic These calculi are mostly formed of uric acid, urates and oxalates Phosphatic calculi are rare in the kidney but are formed in the bladder Acid urine favours the deposition of uric

DISEASES OF THE LIVER AND KIDNEYS

acid and oxalates whereas alkaline urine favours deposition of phosphates. It is difficult to find out the cause of these deposits and concretions.

When larger concretions which cannot easily pass out, are formed, discomfort begins. There is pain in the loins excited by shaking of the body. There may be tenderness on pressure over the affected kidney. Blood may come out with urine. The ureter may be obstructed. In extreme cases the pelvis of the kidney may get inflamed. Pain in the loins due to calculi may be mistaken for lumbago. If the urine is highly acid then it may be suspected that the pain is due to calculi. The treatment will be to take large quantities of alkaline drink. The pain of renal calculi affects distant parts, the lumbar region, the testicles. When a concretion impacts against the ureter it gives rise to renal colic. The pain is often excruciating. The pain shoots into the corresponding testicle which gets retracted and becomes tender. The pain ceases for a time and again comes on till the calculus enters the bladder. The patient becomes pale, pulse is small and feeble, breathing is hurried and temperature may rise, perspires and has a feeling of chilliness. There are sometimes nausea and vomiting. The extent of suffering depends on the shape and size of the calculus. Urine may contain blood during paroxysms. The calculus may remain in the pelvis of the kidney and work injury there. Sometimes in the attempts to get into the ureter it may cause colic and then may fall back. It may

RENAL COLIC

injure the kidney and cause blood and albumin or pus to flow with urine.

Treatment should consist of attempts to give immediate relief and to help the obstruction to pass along the ureter. In the intervals attempts should be made to stop formation of concretions and to make possible painless discharge of those already formed.

For immediate relief there is nothing like opium in 1 or 2 grains doses by mouth or hypodermic injection of morphine hydrochlor $\frac{1}{4}$ grain. In mild cases one injection might do but in severe cases repeated injections may be necessary to induce sleep. The patient should be given warm alkaline drink freely 60 grains of soda bicarb to a pint of warm water to be given during and after an attack. Hot bath, hot poultices and fomentation should be given to aid the effect of opium. The bowels may be washed with a douche of warm water.

During the interval, treatment as indicated for lithiasis is to be adopted and diet carefully regulated. When it is found that the case is not amenable to medical treatment, then surgical aid should be taken.

Uric acid calculi are soluble in alkaline solution. Steps should be taken to render the urine alkaline. For the purpose soda bicarb 30 grains per dose should be given three to four times daily. Emetine hydrochlor in $\frac{1}{2}$ grain doses given on alternate days up to 3 grains with saline and alkaline mixture stops further deposit of uric acid calculi.

Diet in the beginning should be confined to liquids

Pyuria

Pus in urine may be present from various causes. Infection may travel from the urethra due to gonorrhœa or other causes or the infection may come from the kidney wounded by impact of calculus. In any case the treatment should be directed towards removing the cause. In gouty or rheumatic subjects warm bath may be useful. Antiseptics like thymol should be given along with alkalies. Pyuria may be due to an attack of tuberculosis of the kidney. Surgical operation may do some good if only one kidney is affected.

Cystitis

Cystitis is inflammation of the bladder and is met with in acute and chronic form. The attack is very often due to infection, due to presence of crystalline deposits in the bladder or due to putrefactive organisms such as gonococcus and colon bacillus which reach the bladder through the ureters, bowels and urethra. There is pain in the bladder with frequent painful micturition. The urine gets acid and turbid with mucus and pus and may also contain blood.

The patient should be encouraged to take water freely and may be given opium in cases of extreme

CYSTITIS . HÆMATURIA

pain The bladder should be irrigated with antiseptic solution of boric acid or weak potass permanganate lotion (1 in 5,000) twice a day The patient should be kept as far as possible on milk diet and given rest Starch enema containing 2 to 4 grains of opium in 4 ounces of barley water should be given to relieve pain

Hæmaturia

Hæmaturia is presence of blood in urine. Frequently this occurs on account of injury to the kidneys, bladder or urinary passages Blood vessels may rupture from mechanical injury pouring blood into urinary passages Inflammation or congestion of the kidneys, bladder and prostate, cancer of kidneys or tuberculosis or other growths may cause hæmaturia Malarial fever and small pox may cause a morbid condition of blood leading to hæmaturia It may appear as a symptom of disease like cancer or tuberculosis

When the bleeding is due to the presence of renal calculi then cold acidulous drink such as tamarind or lemon in ice water or lemon whey should be given If there is pain opium by mouth should be given or morphine should be injected Blood pressure should be relieved Bowels should be cleared by douching and aperient given Application of ice bag to the loins is useful Dry cupping may also be applied to the loins , when the bleeding is from the bladder then it

DISEASES OF THE LIVER AND KIDNEYS

should first be emptied with the help of a rubber catheter and astringents introduced through it. A solution of alum 2 grains to the ounce will make a good astringent wash.

In haematuria due to malaria or tuberculosis etc the treatment will be according to the primary disease.

Treatment should be based generally on the following principles :

- (1) Arrest of haemorrhage,
- (2) Alleviation of primary cause.

Calcium salts are unsurpassed in arresting haemorrhage. Calcium lactate may be commenced with dram doses and minimised later. Intravenous injection of calcium chloride 5 to 10% solution in 2 c.c. is very efficacious in haematuria. Opium is efficient in relieving pain and giving nature time to recoup. Administration of opium is contra-indicated in albuminuria.

Alkaline drinks should be given freely. Punarnava should be relied upon. If stimulants are required, caffeine or preparations and injections of caffeine are good stimulants, where they are required to keep up the patient.

Hæmoglobinuria

In this the urine has the same appearance as in haematuria, only on examination the urine is found to be devoid of red corpuscles. These are changed before discharge. Calomel in fractional doses and soda bicarb should be given in this stage as an antiseptic.

HÆMOGLOBINURIA ALBUMINURIA

Apart from malaria, cold or chill may bring it about and susceptible persons should be careful in exposing themselves to chill. In syphilitic cases mercury and arsenic with other alkalines and potassium iodide have been found to be useful.

In toxic form blood corpuscles are decomposed rapidly. The origin of toxic condition should be determined and combated (See Hæmaturia). Care should be taken to see if the blood in urine is due to black water fever. Treatment should then be as in black water fever.

Albuminuria

Albumin is not a normal constituent of urine. In certain diseases albumin is discharged with the urine and the disease is known as albuminuria. A simple test for the detection of albumin in urine may be carried out. It depends upon the property of albumin to coagulate on heating. A portion of clear urine is to be taken. If the urine is turbid, it should be allowed to settle but if it will not settle it will have to be filtered. If the filtered clear urine on heating remains clear then there is no albumin. If there is turbidity or if a precipitate is thrown down then a drop of nitric acid is to be added, if it still remains undissolved then albumin is present.

Ordinarily disturbance in food may account for presence of albumin in urine. By a little regulation of diet by taking less of proteins and more of starches

DISEASES OF THE LIVER AND KIDNEYS

and vegetables the urine may be corrected. Radish raw or boiled is highly beneficial in albuminuria. Occasionally albumin may be present for a long time without causing any distressing symptom. Albumin is a danger signal when kidneys are disordered as in nephritis. It will then require serious attention for improvement of general health by rest and moderate exercise, regulated food, massage, sun bath and water bath. Particular attention should be given for keeping bowels open and on choosing items of diet rich in the several vitamins.

Bright's Disease or Nephritis

Bright's disease is inflammation of the kidneys. It may be brought on by several causes. Exposure of the body to chill may affect the kidneys. Exhausting labour also may bring about disturbance and inflammation of the kidneys. Toxins may affect the organs, infective fevers also may bring about Bright's disease. Syphilis or malaria may also be responsible for it. Alcoholic excesses and irritant drugs are sometimes responsible for injury and inflammation of the kidneys.

The symptoms of inflammation of the kidneys are chill and rigor with lumbar pain and vomiting. Headache, constipation and coated tongue are usually present. The temperature is between 100° and 103° F. Cases are attended with or without dropsy. Those with dropsy are more serious. The urine is scanty.

BRIGHT'S DISEASE OR NEPHRITIS

and contains albumin. The urine may also show blood corpuscles and renal casts. The urine may contain blood and have a dark-red colour. There is pallor of the face and the eyelids may be heavy with oedema. The joints may be swelled or there may be diffused dropsy of the whole body. Uræmia may occur in some cases. The cases due to simple causes like that of chill may have a brief course and rapid recovery. But in complicated cases there is a tendency to the disease becoming chronic.

For treatment rest should be given to the injured organs. This is best secured by taking the most non-irritating liquid food having power to maintain. Milk is such a food. Patients should be confined exclusively to milk diet. Milk should be taken in small quantity, a mouthful at a time and should not be drunk off. About 4 pounds of milk daily will be enough for a well-built adult. With this if an equal quantity of water is taken, it will satisfy the need for fluids in the system. In earlier stages, however, large quantities of water are necessary as it helps to eliminate the toxins. Saline purges will do clearing of the bowels. Where milk is difficult to digest, butter milk or barley water only need be given. The congestion in the kidneys has to be removed. Hot linseed poultice and dry cupping are the methods to remove congestion. Repeated application of mustard plaster over the region of the kidneys is very efficacious. In Bright's disease the failure of the inflamed kidney to discharge its function brings in a

DISEASES OF THE LIVER AND KIDNEYS

train of distressing and grave symptoms and toxic condition of blood. The call for removing debris may be then diverted to the skin. The skin should be made to function vigorously to aid the sick kidney. Massage should be regularly done over the whole body along with sun bath ending in a hot water bath for an hour or so. The skin is then stimulated to void much excretory matter which would otherwise have remained mixed with blood. Another channel for aiding the excretory action of the kidneys is the intestinal surface. Exciting the intestinal membrane to vigorous action is helpful. Aperients and saline purgatives as myrobalan, calomel, mag. sulph serve this purpose. Alkaline drinks are also helpful. When there is congestion of blood in the kidneys the blood pressure should be lowered by free use of garlic juice. This is necessary in the early stages. During the progress of the disease however, arterial pressure goes down and urine becomes scanty ; it is necessary to raise cardiac force. For raising pressure and giving general tone to the heart arjun is indicated. Diuretics are valuable to a certain stage when kidneys will respond. Potass iodide has proved a most efficient diuretic in some cases. Where the flow of urine ceases it is necessary to stop feeding by the mouth. Necessary fluid should be supplied to the system by way of subcutaneous saline injection.

The disease may develop to a stage of extreme dropsy or uræmia or cardiac dilatation and end fatally. The symptoms in such cases should be attempted to be

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alleviated as they arise. For example, in extreme dropsy fluid should be tapped out from the peritoneal cavity (paracentesis) and also from under the skin of the legs as is described under cardiac dropsy.

Blanket bath or wrapping a patient from foot to neck with a blanket wrung out of hot water for 20 to 30 minutes once a day is efficacious in this disease.

CHAPTER—XIII

DISEASES OF THE RESPIRATORY SYSTEM

Nasal Catarrh, Coryza or Cold in the Head

Nasal catarrh may be caused by exposure to local action of irritating microbes. It may be due to irritation or due to dust which again attracts microbial attack. Exposure of body to chill and rapid changes of temperature may favour the development of microbial attack. Some persons have a constitutional predisposition for it. The disease is of an infectious character and it so happens that whole family falls ill one by one.

Cold creates a sense of dryness in the nose. This is temporary. After a time when the injury to the mucous membrane has increased, the stiffness goes and thin fluid begins to flow from the nostrils. The eyes and forehead are subjected to catarrhal influence and there is pain in the region. The attack then may be extended to the larynx affecting voice and creating temporary hoarseness. The disease, if handled properly, may be got rid of in 3 to 4 days. But if neglected, it may affect the larynx fully and then attack the bronchial tubes.

Free ventilation and bath render persons less liable to attacks. A degree of sensitiveness of the skin to

NASAL CATARRH, CORYZA OR COLD IN THE HEAD

variations of temperature is associated with attacks of cold In order therefore to be able to ward off attacks, the power of resistance to being affected by variations of temperature has to be cultivated by graduated exposure. Those who are sickly are more apt to catch cold. Improvement of general health is of importance in avoiding attacks.

Rest is to be given to the system to expedite recovery. Medicines such as camphor which induce perspiration, are of use for obtaining relief Free action of the skin may be induced by massage and hot water bath. A little opium at the onset brings relief and sometimes cures cold $\frac{1}{2}$ grain of opium rubbed in chalk may be given 3 to 4 times a day At night 2 grains of calomel is to be given as an aperient followed by a purgative of 3 myrobalan fruits or 9 tablets. Mustard oil may be profitably used for rubbing on the tender surfaces of the mucous membrane A little of it may be sucked in by which the burning or dry sensation in the nose is removed.

When the dry initial stage has passed and fluid has begun to flow there is a distressing feeling of oppression and stiffness about the nasal passages There is pain about the head Pain may extend to neighbouring organs. There may be a feeling of deafness, pain or noises in the ears Difficulty may be experienced in swallowing. There may be a slight fever with quickened pulse, thirst, chillness and aching of the limbs.

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A hot foot bath gives great relief. Soda bicarb, soda benzoate and cinchona are useful when the dry stage is over.

Antiseptic wash of the nose by sucking in some boro thymol alkali solution through the nasal passages has a most wonderful effect. It often checks cold at the very earliest stages. Camphor is a common remedy. It may be dissolved in oil and applied to the nasal passages and also taken internally.

Prescriptions :

Opium— $\frac{1}{4}$ grain

Chalk —5 grains

Make powder. One dose 3 times daily.

Cinchona— $2\frac{1}{2}$ grains or $\frac{1}{2}$ tablet

Soda bicarb—3 tablets

One dose 3 to 4 times daily.

Boro thymol alkali tablet

Dissolve in water. Use as wash for the nasal passages

Myrobalans—3 fruits or 9 tablets to be taken at bed time

Calomel—2 grains with soda bicarb 10 grains at bed time followed up by magnesium sulphate $\frac{1}{2}$ to 1 oz or myrobalans 9 tablets next morning

Sun bath, water bath, hot foot bath; massage and moderate exercise are important measures for shaking off an attack of cold.

LARYNGEAL CATARRH CROUP

Laryngeal Catarrh

This clearly resembles the nasal catarrh which often leads to it. The treatment also is similar. The larynx becomes inflamed and in children the attack may lead to a choking sensation in breathing. This is due to the swelling of the parts and thereby choking of the air passages. A paint of iodine and honey over the affected parts helps to alleviate local distress. If there is dryness of the mucous membrane, some warm alkaline drinks may give relief. Expectoration should be promoted by one twelfth to one eighth grain doses of tartar emetic. Sometimes vomiting is desirable. The bowels should be moved and warm milk and warm liquid food should be given.

In chronic cases, the exciting causes should be removed and sun bath, cold bath and massage should be tried.

The remedies indicated for nasal catarrh are also equally useful for laryngeal catarrh.

Prescriptions

Iodine weak tincture (1 : 40)—1 dram

Honey— $\frac{1}{2}$ dram

Mix and paint on the throat

Other prescriptions are same as in nasal catarrh.

Spasmodic Croup of Children

Functional spasm of the muscles of the larynx is known as spasmodic croup. The child goes to bed

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well but wakes about midnight or early morning with oppressed breathing, dry hacking cough and huskiness of voice. For sometime the oppression and distress are serious. The attack passes off abruptly although the child may get cyanosed during the fit. This is altogether different from the true croup. A prompt emetic or a hot bath will put the child right. If the child had overloaded the stomach during the day, vomiting will at once do what was needed.

Bronchitis

Bronchitis is inflammation of the lining membrane of bronchial tubes leading to the lungs. Bronchitis is generally caused by chill and accompanied by symptoms of cold. Nose begins to run. Limbs ache and there is chillness. These bronchial tubes are divided and subdivided till they become very minute bronchial tubes allowing contact of air with blood. By inflammation the tubes get chocked creating difficulty in free passage of air. This gives rise to a feeling of pressure on the chest and of soreness behind the breast bone. Breathing naturally becomes oppressed and difficult. The inflammation causes dry and hacking cough but little phlegm comes out in the early stage. The patient gets fever and is thirsty and restless, temperature may increase and the pulse rate may go high. It is 102 or even higher. In mild cases, in course of three or four days the cough

BRONCHITIS

becomes loose and there is copious expectoration Then feeling of oppression passes off and also the soreness Generally this happens about the eighth day The fever declines, the expectoration is thrown out without difficulty In unfavourable cases however the disease progresses, the expression of countenance becomes livid, difficulty of breathing goes on increasing and lips become purple Circulation is affected and the lungs not being able to purify all the blood continue to discharge bluish blood to the heart, so poisoning sets in The cough becomes composed of tenacious mucus and difficult to be thrown off The patient expires from partial suffocation and defective circulation

Treatment will depend upon the age and upon the extent of the affected area and upon complications arising out of it Bronchitis may be limited to the trachea and larger divisions of the bronchi It may again be diffused over a wide extent of the bronchial surface and extend to the finest bronchial tubes.

Where inflammation reaches the finest tubes, the import is grave In children the attack readily spreads and is then attended with disastrous results Wheezing sound from lungs is heard in all attacks but when the attack is spread over a large area the sound is very prominent. Bronchitis of children is generally of graver import than of adults While in adults the attack is usually confined to the main branches, in children it travels down readily to the capillaries or the finest ends of bronchial tubes. The

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more the penetration of the inflammation down, the greater is the danger.

The objects to be kept in view for treating bronchitis are to subdue the inflammation, to thin the catarrhal secretion so as to make it fluid and to lessen the expectoration when it is excessive, to promote expulsion of the phlegm, to promote circulation in the lungs and to reduce fever and maintain general strength of the patient.

Hot poultice should be applied over the chest, simple poultice of linseed applied over the front and back of the chest greatly relieves pain. Poultices act by dilating the vessels of the surface and thereby reducing the blood pressure. The heat of the poultice acts as a cardiac stimulant. Poultice should be applied neatly and carefully and should be often renewed so that it does not hamper respiration. Turpentine may be rubbed over the chest with fomentation for the same object. The bowels should be moved. Calomel in $\frac{1}{2}$ grain repeated doses followed up by myrobalans is a useful laxative. Warm alkaline drinks help diaphoresis and also reduce fever. Soda bicarbonate in 10 to 20 grains doses in warm water may be given. Tartar emetic in one twelfth grain doses is highly efficient in the earlier dry stage. It makes the flow thin and promotes expectoration. It should be discontinued as soon as the first or dry stage disappears.

When at the second stage thin phlegm begins to come up something is called for which can reduce and

TREATMENT OF BRONCHITIS

thicken the flow. Creosote is the drug proper at this stage Turpentine may be inhaled or given as a mixture by the mouth Inhalation of water vapour works as an emollient to the irritated surfaces of the bronchi A few tablets of creosote thrown on boiling water make the vapour more useful An open pan containing some water with a small mouth, if put on fire and brought briskly to boil, will give the necessary atmosphere of water vapour Water vapour will come mixed with creosote vapour Creosote is particularly indicated when there are much bronchial irritation and profuse secretion

Benzoates modify the morbid secretory condition of mucous membrane and are of great service in lessening the amount of secretion and diminishing cough Vasaka in 20 to 30 grains or 4 to 6 tablets doses however is the medicine for bringing out expectoration at all stages of its formation dry or fluid. It relieves the spasm from which the inflamed bronchial tubes suffer Vasaka has a persistent bronchodilatory effect and reduces blood pressure When the expectoration is too thick, then vasaka makes it fluid. In somewhat advanced cases and in those with a taint of syphilis or gout or rheumatism, potass iodide 5 to 10 grains doses is a most valuable remedy in tenacious and scanty expectoration When there is difficult breathing, hypodermic injection of strychnine hydrochlor gr 1/60 or administration of nux vomica in 2 grains doses by mouth is an invaluable remedy Nux vomica acts powerfully on the respiratory centre

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and is particularly valuable in stages of exhaustion. Garlic juice in half dram doses or 5 tablets is useful at all stages of bronchitis.

Diet should be fluid during an attack of bronchitis. If milk is well-brone it should be given. Warm fluid is desirable for local relief in the region of the throat, warm milk will therefore be excellent. Otherwise warm sago or barely water may be given.

The action of the skin should be stimulated by gentle massage and warm sponging.

Bronchitis in children should be very carefully treated from the very onset, for an attack extending up to the capillaries is necessarily a serious thing. Children who cannot expectorate should be given tartar emetic in slightly emetic doses say gr. 1/20th to gr. 1/12th doses. It not only causes expectoration but the mechanical compression of the lungs induced by it relieves congestion. After expectoration or vomiting the sticky mucus should be wiped clean from the child's mouth.

When the capillaries fail to work, blood fails to be properly aerated and death by suffocation may take place. In children the disease appears with a slight cold and there may be nothing serious for the first few days. The temperature should be observed and any rise in temperature is a danger signal. With the increase of fever there is more restlessness and there is short, dry cough which becomes more and more noisy, frequent and painful. As the lungs increasingly

BRONCHITIS IN CHILDREN

fail to function, breathing is performed by the muscles of the abdomen which may be seen moving much more forcibly than when normal. The wheezing sound of breath may be heard by putting the ear on the chest or through the stethoscope. Fever and cough are worse at night. The expectoration is white and glass-like. The child's sleep is distressed by suffocative accumulation of phlegm. Often the cough goes into the mouth and is swallowed by the child. Fits of cough often cause vomiting which give great relief by clearing the throat and the bronchial tubes. The child feels thirsty. The strength of the child under unfavourable condition begins to fail, till it loses power to cough. The breathing becomes hurried and difficult, the nostrils dilate, the countenance becomes pale, the child lapses into an unconscious stage and then death takes place.

Exposure to cold is a cause of bronchitis of children. Nervous irritation such as that of teething may cause mild bronchitis. The gums should therefore be examined and if necessary, opened with a lancet.

Prescriptions .

Hot poultice of linseed on the chest Fomentation of turpentine and internally in 5 minims doses in barley water

Inhalation of creosote in water vapour Sun bath, massage and tepid sponging

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Myrobalan one to three fruits or 3 to 9 tablets or
Calomel— $\frac{1}{4}$ grain

Soda bicarb—10 grains

One dose. 4 such to be followed up by myrobalans

Vasaka—6 tablets

One dose. 3 such doses for expectoration.

Potass iodide—5 grains: 1 dose. 2 such doses for tenacious expectoration.

Nux vomica—2 grains or 1 tablet. 3 doses in exhaustion.

Garlic— $\frac{1}{2}$ dram juice or 5 tablets. 3 times daily from the beginning.

Asthma

The bronchial tubes conducting air in and out of the lungs are surrounded by muscle fibres. Asthma is caused by spasmodic contraction of these bronchial muscles. The spasm presses upon the tubes, thereby diminishing their calibre. The choking of the air passages causes a sense of suffocation and constitutes asthmatic attack. These spasms are associated with bronchial catarrh but there may be simple spasms also causing transitory attack of asthma.

An attack of asthma comes on suddenly and generally between two and four in the morning. It may be that during sleep there is diminished circulation and perhaps some congestion. This causes irritation and brings in spasm. The patient wakes up with an attack of difficult breathing. But

ASTHMA

attacks do not always come suddenly. In many instances there is premonition of the coming attack. Languor, headache, flatulent dyspepsia, depression and sleepiness are some of the complaints that forerun an attack. In others there are signs of nervous emotion and discharge of large quantities of pale urine.

The breathing difficulty increases in intensity with rapidity. The patient sits up in bed leaning against a pile of pillows and gasps for breath taking short and forced inspirations followed by prolonged expirations. The extremities are cold and the face pale and with beads of perspiration. There is plenty of air in the lungs and the chest gets distended but the air cannot be got out and renewed. When the attack is nearing its end there is usually a small amount of expectoration in which transparent glistening pellets are thrown out.

An attack may last from two to six hours with variation in its severity, the patient may then fall asleep and wake perfectly normal. Sometimes the attack will continue with short or incomplete remissions for four or five days. If the attacks are frequent and severe, permanent injury may occur to the respiratory or circulatory organs.

For treatment the paroxysm should be cut short by use of medicines. Morphine hydrochlor administered hypodermically is generally very efficacious in cutting short a severe fit of attack. Morphine will often subdue most severe paroxysms of spasmodic asthma in a few minutes. But caution

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should be taken that the patient does not get into morphine habit through use of this remedy. It should therefore be used only in extreme cases of severity. When morphine hydrochlor is not procurable, opium in 2 grains doses should be given by mouth.

There are many inhalations which are wonderfully efficacious in relieving the paroxysms Chloroform inhalation is one such. Chloroform is held before the nose in handkerchief. It should not be pushed to complete insensibility. Its effects however are not lasting. Medicines that lower blood pressure such as the nitrites, are also useful here. In asthma associated with renal diseases, opiates should not be given. Here amyl nitrite inhalation is particularly valuable. But chloroform and amyl nitrite are rarely available in villages and we have to fall back upon simpler things

Datura (Stramonium) :— Its leaves are to be powdered and rolled into a cigarette and then smoked. But a better method is to take 10 or 12 tablets for smoking, as tobacco is smoked on a *hookah*. The fumes of datura at once relieve some asthmatics. For those who are unable to smoke on account of the severity of attack, datura leaves may be burnt within a mosquito curtain with the patient in bed. The tablets may be mixed with some potass nitrate ground together and burnt for fumigation The fumes bring relief to many sufferers

Datura may also be given internally 2 tablets at a time, thrice daily to relieve spasms. One thing has to

TREATMENT OF ASTHMA

be remembered about datura By its free and excessive use general health may be affected Its use therefore should, as far as possible, be restricted to occasions of severe paroxysms

Garlic — Drugs that lower blood pressure are efficacious in asthma Garlic is very useful in this connection It is an antiseptic and in addition it reduces blood pressure It is valuable particularly in asthma of bronchial type

Bala and Ephedrine — Bala contains ephedrine and therefore is very suitable as a cheaper substitute for ephedrine Whereas garlic acts in asthma by lowering the blood pressure, ephedrine works by raising the blood pressure That the source of trouble is in the nervous system is the opinion of many eminent physicians The reaction brought on by lowering or raising of blood pressure affects nerves and helps to get over asthma Ephedrine may be given as injection during spasms. Its effect however is not lasting Old men suffering from chronic asthma have been found to respond admirably to treatment with bala. Bala being a broncho-dilator is particularly useful in bronchial cases

Vasaka — It is a well-known reliever of bronchial and asthmatic spasms In all cases of chronic bronchial asthma vasaka should be given for long periods

Chota Chandra is a valuable drug for relieving blood pressure During paroxysms chota chandra soothes the patient and relieves breathing difficulties

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Kut (*Saussurea lappa*) is another specific for asthma. It has been found to have a remarkable effect in controlling attacks of bronchial asthma. When during sleep some uneasiness is felt about approaching fit of asthma, some kut thrown into the mouth helps the patient to fall asleep. Kut can be had from grocers

Potassium Iodide :— It is a great soother and one of the most reliable drugs in asthma. Two to three of 5 grains tablets twice or thrice daily and one at bed time are to be taken. In chronic bronchial cases it is good to add 2 to 3 tablets of datura with the bed time dose.

Strychnine and Arsenic :— A combination of strychnine and arsenic has been found very useful in warding off attacks of asthma. They are particularly useful in bronchitis and gouty forms of asthma. One tablet of nux vomica and one tablet of arsenic twice or thrice daily after food, administered for weeks have given excellent results

In bronchial cases of asthma the persistence of attack is often due to presence of microbial agency. Asthma is also frequently dependent on diseases of nasal and pharyngeal cavities. If there is any nasal polypus, it should be removed. Treatment of nasal and pharyngeal diseases are said in some cases to have caused disappearance of asthma. The nose and throat in any case should be thoroughly explored and any disorder found should be attended to

Digestive disturbances have got much to do with attacks of asthma. The palate should be controlled.

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An asthmatic will very often find what foods agree with him and what disagree. Food should be simple and the minimum quantity necessary should be taken keeping in view its suitability to the temperament of the patient.

Bowels should be kept freely moved. 2 grains dose of calomel at bed time will be useful followed up by a saline purge the next morning. Then there is myrobalan. Three fruits or 9 tablets may be taken at bed time to act as a mild purgative. Calomel is very good indeed during days of attack. It helps to eliminate toxins. Atmospheric condition is a great factor. Dust and dirt in the air are troublesome to an asthmatic but there is also the reverse experience. Asthmatics from country side when brought in the stuffy atmosphere of cities occasionally get relief although it appears to be paradoxical. Change of climate does good to asthmatic patients.

Prescriptions

Improve general health. Light exercise, regulated diet, sun bath, massage, water bath tepid or cold as is found to suit. Bowels to be kept open.

For reduction of blood pressure

Garlic juice— $\frac{1}{2}$ dram dose 3 or 4 times daily
Larger doses may be taken, if tolerated

During paroxysms smoking and inhalation. Smoke dry datura leaves. If smoking is not possible, let him inhale the smoke created within a mosquito curtain.

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Inhale choloroform by smelling from a handkerchief the patient holding it himself.

For raising blood pressure :

Bala 10 grains or 2 tablets 3 times daily.

Ephedrine— $\frac{1}{2}$ gr. tablet put under tongue or injection 1 c.c.

For expectoration and allaying spasm :

Vasaka— $\frac{1}{2}$ drám or 6 tablets. Three times daily

Potass iodide—5 to 10 grains Three times daily.

For combating exhaustion

Nux vomica—2 grains

Arsenic—1/20 grain or 1 tablet, thrice daily.

We have gone through a long list of medicines which have been found efficacious. But it must be said at the same time that individual factor is also a great thing about these remedies. Some will suit one class of patients and may be found to be ineffective in others. Then again atmospheric condition and climate are great factors. In combating asthma the patient himself has to be his physician to a great extent. Greatest care should be taken about regulating diet and the stomach should on no account be stuffed, while the bowels should be kept freely moved. Precautions about food and climatic changes and judicious use of medicines will go a great way towards relieving the distress of asthmatic attacks and minimise their frequency.

Pneumonia

Pneumonia is inflammation of the lung substance as bronchitis is the inflammation of air tubes of the lungs. Pneumonia may be regarded as a specific infective fever caused by microbes. The affection of the lungs is the characteristic of the special injury done by the microbes.

Pneumonia may be lobar affecting one or more of the 5 lobes of both lungs or it may be lobular or broncho-pneumonia affecting lobules of the lungs. Both sides of the chest may be affected.

Pneumonia is originated often in a chill. Periods of exposure to cold winds are also remarkable for attacks of pneumonia. Lack of free ventilation is a predisposing factor to attacks of pneumonia and when on account of cold winds the vitality becomes normally low, the habit of remaining in closed confined rooms increases the risk of attack of pneumonia. Weak health, early childhood and old age in association with cold atmospheric conditions and stuffy rooms are predisposing causes of pneumonia. Some persons are particularly liable to attacks of pneumonia, having an individual predisposition for the disease. It is an infectious disease. The infection may spread through droplets sprayed off while throwing off sputum or by close contact with patients. The danger of infection from contact can be averted by taking general sanitary precautions. The microbes concerned do not live very long. When exposed to sun light or diffused

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day light they die in an hour, in the dark they survive for about 4 hours. There are some persons who while in normal health constantly carry most virulent pneumococci—the micro-organisms of pneumonia in their mouth. Patients should be given disinfecting mouth wash every three or four hours which will not only do good to the patients but also minimise the danger of spreading the disease.

The attack begins with rigor. The temperature rises rapidly. The skin is felt to be hot and dry. The eyes glisten, the expression becomes anxious and symptoms of toxæmia appear. There are loss of appetite, thirst, furred tongue, headache, aching of limbs and general uneasiness. The normal ratio between pulse and respiration is disturbed. Pulse respiration ratio is 2 to 1, instead of the normal 4 to 1. The respiration may go up to 30, 40 even 60 per minute while pulse goes up to 100 or 130. There is pain in the side which is sometimes extremely severe aggravated by slight movements due to respiration. The patient in his endeavour to check pain increases the shallowness of the respiration and therefore quickens it. The characteristic features of difficult breathing appear, the lips become blue and the end of nose expands with inspiration. Cough is present and expectoration is tenacious and is coloured rusty having blood mixed with it. Coloured expectoration is a characteristic of pneumonia. But sometimes cough and expectoration may be absent in children. The mucus discharged from affected air cells fills them up,

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PNEUMONIA

the affected lobes or lobules become solid technically called consolidated In pneumonia the sound becomes dull and on auscultation normal respiratory murmur is replaced by tubular breathing The above signs and rusty sputum and quick respiration are the diagnosing points of pneumonia

When there is no complication the disease runs its course and terminates by crisis about the 7th or 8th day Then there is rapid fall of temperature and in a few hours it may get below normal In some cases fall of temperature is less marked The lung loses resonance and sounds dull Along with these symptoms there is acute dilatation of the heart which complicates the condition The pain may be intense and unbearable, the cough may exhaust the patient and the temperature may rise up so high as to threaten dissolution The difficulty of breathing may be extreme and the heart may be too feeble to work In pneumonia sleeplessness and delirium are often present aggravating the suffering Adolescents have been found suffering from pneumonia where the temperature has gone up to 106° F and the delirium has made the patient furious and almost mad, difficult to be confined, difficult to be brought under any treatment without application of force But even such cases are not beyond recovery

Treatment should be directed towards stopping the influence of the infective organisms, to bring down temperature when it is high, to relieve the distressing symptoms as they arise and to maintain

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the strength of the patient. Otherwise the patient should as far as possible be left to nature. For anti-infective treatment it is best to begin with an intravenous injection of iodine. Iodine may be injected twice a week to allay the effects of infection and stop further progress of infection. Besides the injection 2 to 3 minims of tincture iodine may be given daily in 1 minim doses by mouth.

Garlic is another very valuable adjunct in the treatment of pneumonia. Garlic juice from 1 to 2 drams of tubers or a few tablets should be given daily. It helps very greatly to relieve the pain on the chest and also cleanse the system of offending bacteria. Quinine or cinchona is another dependable remedy in pneumonia. Quinine acts somehow as a bactericide and helps the restoration of normal conditions 3 to 5 grains daily may very well be given throughout, unless untoward reactions are seen to follow it.

There is often distressing pain on the chest. Local counter irritants are good for improving the condition. Hot linseed poultice, if it can be properly applied, is a very good thing. Before any poultice is applied the chest and sides should be rubbed with a liniment of camphor and turpentine. A thin coating of aconite and datura powder made into paste with aloes may be applied topped by a poultice. These measures give great local relief and help to keep the patient in good condition.

Ventilation must be free and open. It is wrong to keep the patient in a confined room. It has been

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confirmed that pneumonic patients having free air and light recover quickly and the mortality under such conditions is less Pot bromide should be used when delirious condition persists, taking care to administer it as often as is absolutely necessary. Cough accompanies pneumonia and if the sputum is sticky it becomes difficult to throw it off At this stage some expectorant is profitably used Soda bicarb and vasaka are the remedies to be prescribed The heart needs careful watch If the strength of the patient has to be maintained through a long period, the heart must be kept in a fit condition It is always wise to continue administration of arjun from the very beginning Arjun being of a non-poisonous nature may be continued for any period without deleterious effects, while its capacity to strengthen the muscles of the heart is remarkable

In this and other infective fevers the digestive system is injured It would be very necessary to restrict the patient to fluid diet Thinned dahi is good. But even it may cause trouble in the stomach or intestines. Then the patient should be maintained simply on whey or fruit juice

After crisis the temperature may sink to subnormal Care should be taken to prevent collapse at this stage. On rapid falling of temperature, hot water bottles should be kept on bed The action of the heart should be maintained by such general measure as the intravenous injection of glucose 12½% solution in 5 to 10 c.c on alternate days

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The bowels should be kept clean by a daily wash out by enema, wherever practicable. The action of the skin should be promoted to ensure elimination of toxins. Gentle massage after putting the thinnest coat of a bland oil as a lubricant is a very good practice. Cold sponging should be given once or twice daily and the precautions about nursing are to be taken as have been described under typhoid fever. High temperature should be brought down by wet pack or any other suitable cold applications.

Prescriptions :

Garlic— $\frac{1}{2}$ dram or 5 tablets

One dose should be given as an initial dose in the beginning of treatment. It may or may not be repeated.

Vasaka—4 tablets

One dose. Three to four times daily with honey.

Pleurisy

Pleurisy is inflammation of the pleura which is a thin serous membrane double folded and lying between the chest wall and the lungs. Ordinarily the movements of the lungs and of the chest are rendered frictionless on account of the presence of this double membrane. The surfaces of the membrane are in contact in health, moistened by serous fluid which the membranes secrete. In disease or

PLEURISY : TREATMENT OF PLEURISY

inflammation this frictionless condition is disturbed, there is stabbing pain felt about the height of the nipple accompanied by fever which may commence with shiver. There is short dry cough without any expectoration and the cough causes increased pain. The pulse is quick and tense.

Cold is an inducing factor of pleurisy but the real cause is infection from one or other kind of micro-organisms. Pleurisy is very frequently attended with the presence of tubercle and pneumococcus bacilli. Pleurisy may be mistaken for inflammation of the lungs but the cough of pneumonia is generally attended with expectoration of a rusty character and the pain in it is of a dull aching character. In pleurisy there is sharp stabbing pain shooting to the front of the chest to the collar bone and to the arm pit.

Treatment consists in keeping the patient in a warm place free from draught. The bowels should be kept moved and massage given to improve circulation. Warm water sponging should be given once or twice daily taking care to avoid chill. In the early stages an intravenous injection of iodine will be very helpful. Potass iodide by mouth is the chief item of drug for the disease. Application of tinct. iodine over the affected area is also effective in allaying pain. Iodine however should be painted without bringing out blister. Hot linseed poultice is good. The poultice may be applied after rubbing the chest with some turpentine oil, which may also be conveniently incorporated in the poultice.

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The case may become more serious by accumulation of fluid between the two linings of the pleura. Absorption takes place normally in a few days after remission of fever. For inducing absorption poultices and iodine treatment should be continued.

Should the quantity of accumulated fluid be such as to interfere with breathing then a surgeon's aid should be taken to draw out the fluid. When the accumulated fluid contains pus or is wholly pus the disease is called empyema. Here again surgeon's aid is necessary for draining the fluid.

Caffeine-aspirin is useful in the pain of pleurisy. In advanced cases application of mustard plaster as an irritant is recommended. Such plaster should be applied in patches only, not over an extensive area at a time. In order to increase the rate of expulsion of toxins from the system, aperients should be given. Myrobalan 3 fruits in one dose or calomel 2 grains at bed time is very good. Calomel in fractional doses may be continued for sometime. Where the fever is attended with distinct rheumatic complication sodium salicylate should be given. Throughout the stage of attack small doses of opium are very helpful in inducing absorption of accumulated fluid and also for alleviating pain. Opium should be given in one fourth grain doses by mouth mixed with an inert substance such as chalk.

During convalescence quinine, nux vomica and strychnine may be continued for sometime with advantage.

TUBERCULOSIS

It is said that 66% of pleurisy cases terminate in tuberculosis. So the patient after recovery should be carefully watched for a couple of years to guard off unhealthy sequence.

Prescriptions. (See Pneumonia).

Special preference should be given to potassium iodide and in every prescription of above pot iodide may be reasonably added in 5 grains doses.

Tuberculosis

The tubercle is a kind of micro-organism, a bacillus. It is found in human beings and in cows. Tuberculous cows are a very serious source of infection particularly to children. The bacilli are present in the milk of the affected cows. When such milk is taken by children without proper boiling and consequent killing of the bacilli, the children get infected. Bacteriological examination of blood reveals the difference between bovine and human tuberculosis. Bovine type is seen in children and in adolescents up to 15 years of age. Upon this some conclude that bovine type changes to human type after being in the human system for sometime. 12 per cent cases show bovine origin.

The commonest source of infection is from men. Tuberculosis affects town dwellers more than village people. It is so far prevalent in towns that an authority on the subject maintains that 90 per cent

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of persons dying in towns of diseases other than tuberculosis showed on post mortem examination tubercular patches in the lungs. These persons lived and died without knowing that they had the disease. Another authority states that 75 per cent of total rural and urban population show tubercular affection. In one third of these cases the bacilli are dead and only the scars remain, in another third the bacilli are resisted by the system and are therefore quiescent and in the remaining third the bacilli are active. In civilised areas 10 per cent of total deaths are said to be due to tuberculosis.

The main gate through which the bacilli find entrance into the system is the air passage by way of inhalation. The bacilli may reach the lungs by infection from the intestinal mucous membrane, from the thoracic duct and through the blood stream. Infection through the adenoids, tonsils and the pharynx are also common.

Where the bacilli get into the lungs from the air passages and from other places of lodgment, they run the risk of being engulfed by leucocytes, being treated as enemies, which they really are. The success of the fight of the leucocytes will depend upon the power of resistance of the individual and the virulence of bacilli. The bacilli may live on but may be prevented from doing harm by being isolated by barricades of tissues or the bacilli may break through all attempts at defence and go on multiplying and killing tissues and eventually killing the host. The

time of struggle will depend on the resisting capacity of the individual and the anti-toxins he may produce. A regular strife may be said to be going on. At one time the bacilli get the mastery and another time the resisting capacity of the individual gets mastery. If the resistance is greater the bacilli die or are forced to remain inactive. If the resistance is less then the disease progresses which is liable to be checked again if by any means the resistance can be increased. It is, as it were, a step by step fight, the individual requiring at every moment utmost reinforcement that can be mustered.

Bacilli and Infection —The body temperature at 98°F is the most suitable temperature for the tubercles to live and multiply. Their growth is arrested below 82°F and above 107°F . If they are boiled they die. By exposure to direct sun light for a time they are killed. The bacilli grow favourably in moisture and darkness. The commonest source of the bacilli is the sputum. Sputum may get in contact with clothes. When an affected patient speaks, coughs or spits droplets of sputum too small to be visible, may issue with the current of air thrown from the mouth and get deposited on the body and clothes of persons standing near. The clothes of such persons then get contaminated with the bacilli. The sputum may be thrown on the floor or walls near about affected persons and the bacilli may live on till carried by wind or by further direct contact to other places. The sputum may be thrown on streets and the

street dust containing bacilli may be carried off by being floated on air and thence be breathed into the lungs. A single drop of sputum thus mixed with dust and carried on wind may infect quite a number of persons. The sputum on floor of courtyards or streets may be trodden upon and carried from place to place and to home and there allowed to soil the floor. Children play on the floor and have the dangerous habit of putting their fingers in the mouth. From infected spots on floor to a child's stomach is a straight run. Clothes in contact with droplets of sputum may find entrance into the system through food, through soiled hands and through the nose. The tubercles like to dwell in the human system for our body temperature suits them most. They do not like sun light or even diffused day light. Sun light kills them and even exposure to diffused day light will kill them. They thrive in darkness and also in damp. Darkness and damp go with poverty and squalor. It is therefore a disease mostly of the poor and particularly of those who have low resisting capacity. While all are liable to be attacked it is only the poor and sickly who readily fall ill or those whose resistance is run down.

A single person in advanced state of attack with cavities in the lungs filled with pus may throw out in course of a day millions of bacilli, only several of which may be enough to infect a person. Knowing again that out of every 100 persons 75 have already got tubercular infection, it may sound curious as to how

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people manage to live. They manage to live on account of their natural power of resisting tubercle bacilli. The infection is already wide-spread and the sources for further spreading abundantly exist. The fact that we do not get more cases of declared tuberculosis is that man's resisting power is very considerable. The area of the lungs and their capacity contribute to keep down the number of declared cases. Our lungs are so big that only one of them is enough for all ordinary purposes. If on account of tubercular attack partial injury is done to the lungs, still ample room for recovery may be left. In fact, if only one twelfth of the lung area is left intact a man can live on. The entire lung area is not surrendered to tuberculosis at the very onset. The bacilli have to occupy the lungs inch by inch in a pitched fight. While the bacilli create and spread toxins in their life process, the system also produces anti-toxins and tries to check the onward progress of the disease. The anti-toxin bodies produced in the system create a sort of immunity to the bacilli. This theory was worked upon to its legitimate consequence and vaccines were produced which will lead the blood with so much anti-toxin as to make the bacilli ineffectual. But in practice, the scientists have not been able to find a dependable anti-tubercular body which will kill tubercular bacilli. In spite of this fact, modern physicians have known what conditions are conducive to the growth of tuberculosis and what conditions are conducive to the destruction or arrest of the growth of tuberculosis. It

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may not be possible for a person to avoid tubercular infection altogether but it is always possible for a healthy person to struggle on and in a majority of cases, successfully against tubercular attack.

Character of Infection and Symptoms :— The immediate result following the admission of bacilli into the lungs depends upon the number and virulence of the organisms and also upon the natural or acquired resistance of the subject. The bacilli may be engulfed and destroyed by the leucocytes and tissue cells. If the bacilli are dead, the trouble ends there and nothing but a scar is left in the lungs. But the bacilli may be too numerous or too virulent to be so easily destroyed. Then they go on living and multiplying and in their life process throw off toxins. The absorption of this toxin by the tissues excites a massed attack by the cells on the organisms. The result of such an attack in a favourable case would be that the tuberculous nodules will be finally transformed into fibrous tissues. Then no further progress of the disease takes place. After the diagnosis of tuberculosis, it is the aim of the physician to create such resisting condition in the patient that this phenomenon may happen, namely the death or confinement of a tuberculous nodule into fibrous condition.

This however may not happen. The organisms then continue to grow and form nodules in lungs, creating injury. The character of injury and also of the symptoms vary with the site where the bacilli primarily settle and develop. An attack of the blood

CHARACTER OF INFECTION AND SYMPTOMS

vessels causes early haemoptysis If the organisms are working mischief to the walls of alveoli then crepitations are heard in the lungs while changes in the walls of bronchi give characteristic sound Once the disease is fairly settled in a patch it may extend and on its mode of extension will depend the character of phthisis as to whether it will be an acute attack or slow or chronic attack The micro-organisms continue to destroy pulmonary tissues and give rise to caseation or formation of a cheese-like material These are expelled as tuberculous sputum Caseation increases and individual pits in lungs coalesce causing excavations or small or large cavities in the lungs This process of ulceration and necrosis goes on destroying the surrounding tissues The tuberculous material may be converted into fibrous tissue In the unaffected area surrounding a nodule there is congestion of blood which causes the physical sign of bronchitis When the alveoli and the bronchioles are attacked, pneumonic or broncho-pneumonic condition is exhibited

The formation of fibrous tissues necessarily causes contraction and the lung goes on shrinking with the advance of the disease and in extreme cases the heart is displaced from its position between the lungs

The injury caused by the organisms is not confined to the lungs for they create toxins which have their effect on the whole system These poisons or toxins are responsible for fevers, sweating and wasting These toxins also create muscular debility, dyspepsia

and various other troubles which go as symptoms of tuberculosis.

Tuberculosis may commence with high temperature as in acute type. It may be first noticed with haemoptysis, or commence with an attack of pleurisy or follow influenza, measles and whooping cough or other eruptive fevers. Finally it may begin insidiously without giving any indication till it has advanced far. We may classify tubercular symptoms into two broad classes. Symptoms due to toxic action of the bacilli and those due to reflex action on other organs through the lungs

(a) **Symptoms due to Toxins** :—They are fever, night sweat, languor, loss of appetite, loss of strength and weight, digestive and nervous disturbances, changes in the heart indicating weakness and lack of endurance. These symptoms are marked mostly with a general running down of health.

(b) **Symptoms due to reflex action on other organs** through nerves are . hoarseness of voice and irritation in the throat, cough, stomach troubles such as colic, gas, constipation, the heart is slowed down abnormally and beats abnormally rapid on exertion.

Hæmoptysis is another symptom but this may occur late or early according to chance and nature of affection

Hæmoptysis :— The onset of tuberculosis with hæmoptysis is a favourable circumstance as it very often helps the patient to be put under treatment than would have been the case otherwise. In treatment of

SYMPTOMS OF TUBERCULOSIS

tuberculosis the stage of attack is a very great factor. The earlier the detection, the greater the chance of recovery and the shorter the period of treatment necessary. Spitting of blood may occur from other causes but it would be well to treat such cases as of suspicious tuberculosis, even if definite proof of the presence of bacilli is not obtained. The quantity of blood varies from just enough to cause a tinge, to several ounces. It is usually bright-red and frothy in character. Cough with expectoration of frothy bright-red blood is very characteristic of pulmonary tuberculosis. It is a characteristic of this haemoptysis that the attack does not end abruptly but continues for a day or two. Tubercl bacilli are generally absent in early haemoptysis of tuberculosis.

Pleurisy — Tuberculosis of lungs may follow an attack of pleurisy or the disease may be made manifest after a long time after the attack of pleurisy, the bacilli remaining quiescent in the interval. Some experts observe that 30 per cent of all cases of pulmonary tuberculosis give a history of pleurisy. About half the cases of pleurisy ultimately develop tuberculosis of lungs. As a matter of safety, every case of pleurisy may be regarded as one of suspected tubercular origin.

Tuberculosis however generally comes on insidiously and does not present any pulmonary symptoms for a length of time. The patient begins to feel generally unwell, there is loss of appetite and a feeling of lassitude. These symptoms in the

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case of tuberculosis are due to poisoning effect of the toxins produced by the bacilli. Along with these or after a little time the patient will show a slight evening rise of temperature and quickened pulse. Cough may or may not be present or there may be slight cough in the morning with little or no sputum. There may be dyspepsia and atonic condition, neurasthenia, clammy skin and tired voice. All these symptoms however, may be due to quite different causes but these symptoms should certainly not be neglected. Some of these may be absent but a general grouping of them will always suggest the possibility of insidious tuberculous attack. In young adults however, these atonic symptoms together with muscular wasting are invariably due to tubercular toxins.

Cough is one of the commonest symptoms of pulmonary tuberculosis. It is worse in the morning accompanied by some sputum or vomiting.

Dyspnoea puts the patient greatly ill at ease and a patient coming with a complaint of breathlessness, may on questioning be found to be having all the other symptoms characteristic of insidious tubercular attack.

Hoarseness :— The voice may be affected early very slightly but it is only when the pulmonary attack is well established that the larynx is seriously affected and the characteristic hoarseness becomes evident. This hoarseness is due to the lodgment of colonies of bacilli.

SYMPTOMS OF TUBERCULOSIS

Pain in the chest will sometimes put the tubercular patient on the move to find what is wrong with him. The pain may be due to adhesions in the pleura or muscular pain due to violent cough. This pain is never severe and is chiefly confined to diseases of the chronic type.

Fever — A persistent evening rise of temperature is suggestive of tuberculosis. The rise generally is confined to 99° or 100°F . This is the chronic type. In acute attacks there is high temperature.

Wasting — Another symptom should never be neglected. It is waste associated with loss of appetite and strength. Mere reduction in weight may be a seasonal thing also but tubercular waste is progressive.

Night sweats are more to be found in advanced stage of the disease. But in early cases also night sweats appear. On however taking care for improvement of general condition, night sweat is one of the first things to disappear. On account of general pulling down of health there is a general clamminess of the skin indicating that the skin refuses to function properly having become insensitive to impulses.

Tuberculosis of the lungs follows most other diseases of tubercular origin in other parts of the body. Tuberculosis of the joints such as knee, hip, elbow, wrist, ankle etc., tuberculosis of the abdominal organs and spinal tuberculosis etc. are found in some cases accompanied by active tuberculosis in the lungs. The dangerous active

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forms of tuberculosis namely the miliary and the broncho-pneumonic types are invariably found to be secondary to a focus of disease in some other organs of the body.

Two types of tuberculosis may be clearly distinguished, acute and chronic. The acute type is either of miliary tuberculosis or tuberculous pneumonia and tuberculous broncho-pneumonia.

Acute Tuberculosis

Miliary tuberculosis is of sudden onset. Both the lungs are suddenly studded with minute tubercles in consequence of infection by the blood stream from some pre-existing sources. This disease may develop from a chronic tuberculosis of the lungs. At a stage of chronic infection in the lungs the blood stream gets infected and then the rapidly spreading form of the disease appears. Whereas in all acute types the prognosis is grave, in miliary form the disease is almost invariably fatal. It may drag for a few weeks. The patient suffers from high fever of irregular type with rapid pulse, loss of strength, cyanosis and difficult breathing which are out of proportion to the other physical signs. The respiration may reach 60 to 70, cough is slight but it is severe, the sputum is scanty and frothy and sometimes tinged with blood. Examination of the sputum generally gives negative results regarding the presence of bacilli.

ACUTE TUBERCULOSIS

Cases of the miliary tuberculosis of lungs may be mistaken for typhoid fever or ordinary pneumonia. In miliary tuberculosis however, although the temperature may not be a sure guide but difficulty of breathing and blue tinge at the extremes are more marked and the abdominal symptoms and the spots of typhoid are absent. The difficulty of breathing goes on increasing and the blue tinge at the extremities help to diagnose cases of miliary tuberculosis.

When there is cough attended with fever it is difficult to differentiate between miliary tuberculosis and capillary bronchitis. But capillary bronchitis is a disease of childhood and of old age whereas miliary tuberculosis is the disease of young adult life. If there is a marked emaciation then the diagnosis would be in favour of tuberculosis, there is cyanosis in bronchitis also but it is not so marked as in miliary tuberculosis.

In tuberculous pneumonia the onset is sudden, accompanied with high fever of uncertain type, sweating, cough, expectoration and pain in the chest. Sometimes there is a definite attack of haemoptysis. The disease may be confined to one place but the whole lung may be infected. The disease generally terminates fatally but not necessarily so. Some cases after running a course frequently pass on to the less dangerous chronic stage.

Tuberculous broncho-pneumonia frequently known as galloping phthisis is mostly a disease of the childhood but many adults also fall victims to

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this very dangerous disease. It is liable to follow weakening, infective, febrile and other diseases such as whooping cough or measles. In these disease the capillary bronchi of both lungs are simultaneously affected. High fever, difficulty of breathing, cyanosis and waste are its characteristics like those of tuberculous pneumonia. It is distinguishable from miliary tuberculosis by the flushed face, bright eyes and alertness as compared with the apathy, pallor and prostration of acute miliary tuberculosis. These cases rapidly progress to a fatal end. Chronic bronchitis may appear to be like tubercular bronchitis. But there is a great deal of difference in the deport of the patient in the two diseases. In chronic bronchitis the patient does not look ill and there is no progressive wasting.

In a child or young adult broncho-pneumonia should be regarded with suspicion, for at this age the disease may be of tubercular, origin and if the course of disease exceeds three or four weeks, the possibility of its being of tubercular origin is increased

Chronic Tuberculosis

Chronic pulmonary tuberculosis of the lungs is the form most commonly met with in tuberculosis. The attack manifests itself gradually and pursues a comparatively less active course. But there are cases in which the disease comes on suddenly drawing forth haemoptysis or closely follows pleurisy.

CHRONIC TUBERCULOSIS

Usually at the onset of the disease the patient has a slight cough which is more marked at night or after an exertion. There is usually no sputum or slight mucoid sputum. The pulse rate is enhanced. There is a general feeling of uneasiness and discomfort. Symptoms of dyspepsia or anaemia also appear. There is almost markedly an evening rise of temperature and night sweats appear. Sweating may come at little exertion but even during sleep the patient finds that his underclothings are moist with sweat, often requiring a change. Vitality is visibly and progressively diminished and waste continues to progress. Often the rise of temperature and waste are directly connected. The higher the temperature and the longer it remains during the day and night, the greater is the waste of the body. Cough also progresses and develops into hacking form, sometimes bringing out sputum and sometimes nothing, while occasionally the sputum is tinged with blood. If the portions of the lungs are so affected as to disintegrate minute portions causing them to bleed, then patches of sputum are tinged red with blood. Haemoptysis may occur at any stage.

Haemoptysis may occur early when the bacilli get lodged into one of the blood vessels of the lungs and it may occur very late when the lung substance is considerably destroyed affecting the blood vessels. The bacilli may travel upwards and injure the larynx. Patches are formed on this organ affecting the voice and causing hoarseness. These symptoms may occur

early or late, may come singly or all at once and some of them may appear and others may be absent. But the one constant factor is progressive waste with the progress of the disease. This one symptom alone ought to put one on guard and suspect the presence of tuberculosis.

With the waste of body all the organs are gradually affected. Impaired digestion, diarrhoea and liver troubles become marked. Difficulty of breathing increases and the patient reduced to a skeleton passes away. Sometimes there is auto-infection. The bacilli spreading from one organ to another or passing on from chronic pulmonary tuberculosis to one of the acute and very fast progressing fatal forms.

In the earlier stage bacilli may be absent in the sputum or in blood but later on as the disease progresses eating into the lung substance, millions of bacilli get released mixed with the sputum and help to spread the disease.

Prognosis :— If 75 per cent of total population and 90 per cent of city population show tubercular affection, it means that tuberculosis is in quiescent stage in so many. A percentage of those in whom the bacilli are active and multiplying only dies directly of tuberculosis. In such a wide-spread disease it must necessarily be said that the prognosis in chronic cases is generally good. None need despair at the appearance of tubercular symptoms. If the case is taken up early then there is every chance of recovery.

PROGNOSIS OF TUBERCULOSIS

One thing about tuberculosis is that the patient must cheerfully obey the restrictions imposed upon him or her. Life is a bundle of restrictions. The tubercular patient has to cultivate patience and a spirit of resignation. No good will come in trying to hide the disease or in trying to be cured in a short time and join usual work. No, a patient must be ready to avoid work for one or two years. If the attack is slight then six months may be necessary to check the progress of disease and another six months to enhance capacity for work to normal. The more serious is the condition, the longer is the time it will take to get recovered. The word 'cure' has a peculiar significance. It means arrest of disease at the stage and ability of the patient to work normally. The lung substance destroyed by bacilli can not be rebuilt. The injury once done is permanent. We have already explained that we have great reserve capacity in lungs so that if a portion is destroyed and it does not get repaired, the lungs do not resume original capacity to work. But still it is to be called cure if the patient can do all work as any other man and such recovery is very common in tuberculosis.

In acute types however, the matter stands differently. The prognosis here is grave. Miliary tuberculosis is almost invariably fatal and tuberculous broncho-pneumonia is also rapidly fatal whereas in tuberculous pneumonia the termination is fatal unless the acute type passes automatically to chronic type with cavitation.

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Prognosis in chronic tuberculosis however also resolves into a question of prolongation of life. For, if the bacilli are quiescent and the patient is otherwise healthy and strong it is regarded as a case of recovery. More proper it would be to express how many patients live how many years after treatment. In an investigation in 1000 cases of tuberculosis including those who refused to be treated, death occurred to 29 per cent within 2 years of onset. While 8 per cent lived to 10 years after onset, but the result is not exhaustive for many patients could not be traced and were lost sight of.

A good family history is a favourable indication as it points to a normal healthy stock. Tuberculosis imparts immunity in the blood and a patient with a history of tuberculosis on the maternal side is expected to show greater resistance. But the history of the disease of acute type amongst brothers and sisters is of grave moment, it indicates poor resistance and at the same time virulent infection. Beyond adolescence the older the patient, the better is the prognosis. The cases of young adolescent females are least favourable.

High temperature is an indication of active progress of the disease and is a serious matter. High temperature, if followed by subnormal temperature and progress of disease, indicates approaching death. Gradual decrease in temperature is a hopeful sign. The higher the temperature rises above 100°F, the more unfavourable is the outlook. Rapid pulse is

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a bad sign and if on treatment the pulse rate does not come down the prognosis is bad. A patient with a calm outlook of life and who does not worry has more chances than the worried and high strung person

Progressive loss of weight and increasing loss of strength indicate progressive activity of the disease and are unfavourable symptoms. The response to treatment is also suggestive. Those responding have better chance. If on exposure to sun and air the skin assumes healthy appearance, then the prognosis is very hopeful.

Tuberculosis may undergo spontaneous cure without treatment. It may get cured quickly or it may cure after a prolonged course. It is difficult to forecast the duration of life because cases after cure may again develop active form.

Immunity — The uncivilised people are immune from tuberculosis so long as they do not come in contact with persons having tuberculosis. The reason is that in natural state in free contact with earth, air, water and sun light and free from worry, these people live in such a state that the tubercle bacilli in them are non-pathogenic or non-disease-producing. Bacilli they have, they take and impart but these bacilli have not grown to be disease-producing. So, the immunity of the so-called uncivilised people is an immunity of isolation. Certainly these people are not immune to the attacks of virulent tuberculosis. On the contrary, they are less-resisting and are adversely

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affected by virulent bacilli. They may simply be extinct by coming in contact with a population who have got virulent active bacilli in them.

The rural people also enjoy comparative immunity in their own areas. There is less incidence of tuberculosis. But they are less immune to the attacks of virulent type than town's people who are constantly being dosed with the bacilli. When rural people come to town they are more apt to succumb to tuberculosis than habitual residents of towns and cities.

This is natural because of an well-known scientific fact. Every toxin creates anti-toxin which fights the toxin and increases the resistance of the subject and therefore imparts habitual immunity. In cities where tubercular bacilli of a virulent nature are constantly entering persons, there is a sort of inoculation going on. A small group of bacilli enters a person and lodges and the man sets up defence, his leucocytes go and fight and kill the bacilli and in the very act he develops anti-toxins or imbibes partial immunity. If a still stronger dose will come the same phenomenon may be repeated with greater acquisition of immunity. The fight increases the resisting power of immunity of the individual. Now suppose the same dose of bacilli is taken in by a new arrival from a rural area. His system is free from anti-toxins and he will be running greater risk of being adversely affected by the invasion and his natural power of resistance may be of little use in face of the virulence.

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So real immunity comes from development of anti-toxic bodies within the system produced by previous contacts with tubercular bacilli. Even in the towns there are sections. A dweller of the richer section of the town is likely to be adversely affected in the slums of the same town where he is apt to get extra virulent doses in larger quantities and with greater frequency. Whereas it is desirable that every one should avoid contact with tubercular bacilli, it is also an observed fact that these contacts in small doses impart comparative immunity, but only comparative and not absolute. Scientists have not as yet been able to devise a method by which immunity can be secured artificially. The introduction of tubercle bacilli by inoculation was a step in that direction but it failed in achieving that although it is good adjunct in the hands of an expert in treatment of tuberculosis.

It comes to this, that a person living in an area where he comes in direct or indirect contact with tuberculous patients and enjoying health is concluded to have acquired some degree of immunity.

It has been found for the same reason that an old civilised race like the Jews is more immune from the attacks of tubercular bacilli than other modern races living under similar conditions of life and work.

The underlying truth about it is this that the non-pathogenic bacilli in men with primitive habits get pathogenic character by unnatural living as in,

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towns and slums. The reverse of this also is true. The pathogenic varieties lose their virulence by adoption of natural or primitive condition of life. This means plenty of contact with air, light, water and earth and requisite exercise suitable to the physical condition for the time and also unwarried mind. Worry breaks down resistance and immunity and is a great factor in tuberculosis.

Prevention —The prevention of tuberculosis in a population will mean change of the character of bacilli by making them less virulent by alteration of the sub-sanitary and occupational habits of the population. Avoidance of contact is necessary to prevent spread of tuberculosis but a tubercular patient may be a harmless companion if both will keep within certain bounds and avoid things calculated to spread infection. If people are taught these methods then tuberculosis will not be looked upon with the horror it is done today and death rate from tuberculosis will go on decreasing as happened in many towns of Europe and America.

At one time tuberculosis was regarded as hereditary. Because obviously the children of tubercular parents developed tuberculosis in many cases. But it has been found that tuberculosis has to be acquired. It does not come from the blood of the parents. But children of such parents continually run the risk of being dosed with tuberculosis from their parents. Besides tuberculosis in parents may produce a tubercular predisposition in offspring.

PREVENTION OF TUBERCULOSIS

A history of tuberculosis in brothers and sisters is of more importance. An open case in a house constitutes a grave danger. Cases are known that after the death of one child, parents have lost all their children at different ages and at long intervals of time. The articles of use of a tubercular patient, the room and the very house itself may be so thoroughly infected that it may be idle to expect any one escape fatal consequence unless having acquired special immunity. All open cases should be isolated.

The problem of prevention should be tackled from the very root. The infection in children starts with infected tubercular cows. Not only milk but stools also of tubercular cows contain bacilli. Segregation of such cows would have been a good proposition but so long as that is not possible, it is necessary to attend to other details for prevention of tuberculosis through contaminated milk. All milk should be perfectly sterilised by boiling before drinking. The bacilli die when heated and boiling is a safe method of freeing milk from tubercular contamination.

The natural power of resistance of persons should be increased and maintained on a high level. This means living in lighted and airy rooms. The highest death rate is from crowded and insanitary areas. A city atmosphere associated with squalor and poverty, dark streets and confined air, uncleanliness and general insanitary conditions breeds tubercular bacilli. Prevention of tuberculosis means the bringing about of conditions reverse to above.

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The bacilli do not thrive in sun light or even in diffused day light. The homes in city or village should be well lighted, dry, airy and in other details sanitary in order that tuberculosis may find no habitation in them. These are radical preventive measures. Short of this, the conditions should as far as possible approach to these

Malnutrition is a predisposing cause to development of tuberculosis or many other ills. Then again there are certain occupations which render one liable to injury of the lungs and thereby predispose one for tuberculosis. The occupations in which dust has to be inhaled such as in stone cutting, metal cutting, grinding and polishing. Occupations where long sedentary hours tire one out as that of a tailor or shoe-maker are fruitful causes for the spread of tuberculosis. The unhealthy conditions that exist may be mitigated if a prevention of tuberculosis amongst shoe-makers and tailors is desired. It is notorious that there are many families amongst the poor shoe-makers affected with chronic tuberculosis. Their living conditions help the spread of the disease.

There are certain diseases which cause a predisposition for tuberculosis. Measles, whooping cough in children may be followed by tuberculosis. Debilitating diseases and infective fevers cause predisposition to tuberculosis such as malaria, diabetes, syphilis etc. Mental deficiency is also said to be a predisposing cause.

PREVENTION OF TUBERCULOSIS

Tuberculosis as we have already found is a widespread disease and there are many who are already affected as is generally believed 70 per cent of the population is already infected. The question resolves here into one of increasing resistance. Whatever will increase the resisting power will be conducive to prevention whereas darkness, warm and damp atmosphere, overwork, worry and exhaustion will invite tuberculosis.

An open case in which the patient is expectorating millions of bacilli in a single day is a very great source of mischief and has to be carefully attended to see that the infection is not spread. It may be that the disease is far advanced, that the patient is not likely to live long. Yet arrangements may be made so that if a few other prospective patients' lives may be saved.

In case of one suffering from acute tuberculosis the sputum comes out infected with bacilli. Steps should be taken so that the sputum may be collected in an aseptic condition. The disposal of such sputum is easy. The thing may be burnt. But collection is difficult. If the patient is bed-ridden then all that need be done is to keep watch that every time the patient expectorates the attendant carries to the lips a vessel in which he throws the sputum. The pot is to be kept coverd. At the end of the day the whole contents may be burnt after mixing with sawdust or paddy huskings and little lumps of cowdung cake. The smaller the vessel, the easier

it would be for the patient to use it. A screw cap aluminium water pot may also be used for the purpose, within which may be inserted a small glass which is usually provided with such vessels. The bottom of the glass is to be taken off so that it works as a funnel and prevents splashing while handled for use.

But a patient who is not confined to bed and walks about, presents difficulty. He may carry in his pocket some cut pieces of paper and a thick paper envelop. Sputum should be thrown on the pieces of paper held in hand and folded and put into the envelop. The wiping of the lips should be done with similar pieces of paper and kept in the envelop. On return home the envelop and its contents should be burnt. For home use also such paper and envelop may be used.

Where it is imperative to use open basins, some strong disinfectant should be put into them and the mouth kept covered. The contents are to be burnt.

The nails of the patient, the extremities are to be kept scrupulously clean. The mouth and the lips should be treated with antiseptic wash as often as possible.

It is needless to say that the patient should avoid direct contact with other inmates of the family. His utensils should be kept separate and persons attending on him should do so from a distance so that droplets from the patient's mouth may not reach them. The

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floor of the room should have sun's rays playing on it. If it is a mud hut a daily coat of *lep* of earth and dry cowdung mixed with water should be given to avoid dust. The sweepings from the patient's rooms should be put under earth.

Treatment — Tuberculosis though a deadly disease, is a curable disease if treatment is taken in hand early. Treatment consists in rendering the habitation of the bacilli, that is the patient's body less favourable to pathogenic condition. We know that men in natural state get tubercular bacilli which are of a non-pathogenic nature and that by living the artificial life of a civilised man the non-pathogenic bacilli develop pathogenic quality. In treating a tubercular patient we should attempt to put the patient back as i were into the state of nature.

The room should be open and allow plenty of air and light inside. The life lived should be an outdoor one. Where health conditions permit, there should be as little covering to the skin as possible so that fresh air may play on the body. Water baths are invigorating and should be given, whenever possible. Exposure to sun in advanced stage may cause too much reaction. Gradual exposures to morning sun only should be attempted at the early stages. Exposure to sun is by itself a treatment and will be dealt with separately.

Nourishing food should be given consistent with the capacity for digestion. It is no good stuffing the stomach with food which it cannot assimilate. In

tuberculosis there is waste going on daily and there should be an attempt to give the normal food to the system plus the extra quantity necessary to make up the waste. Sufficient fresh vegetables, fruits, fresh milk, dahi should be given to the patient. It is a good sign if the patient goes on to add weight. The stomach and the lungs being embryologically made out of the same tube, the two organs are sympathetically reacted upon. A disturbance of the lungs reflects upon the working of the stomach and more often than not disturbance of the stomach accompanies tuberculosis. With defective system it is often a problem as to how to feed a patient so as to recoup waste yet not put an extra tax on the stomach.

Free air is a great help for recovery of patients. Free air is flowing air as distinct from stagnant air. Stagnant air is uncomfortable and injurious. It is injurious not because it contains too much carbon dioxide. Free air gives tone to the skin while stagnant air stops evaporation from the skin surface and that makes all the difference. A current of air passing over the body gives tone to the nerve endings on the skin.

Cold is bracing and no one should put off fulfilling usual routine programme for the day on account of cold. Exposure to cold can do no harm if the system is trained to tolerate it. In fact, exposure to cold, to current of air, to water and to sun all are conducive to increasing the resisting capacity of the system. And the one treatment of importance in

tuberculosis is the increasing of the resistance of the system to tubercular bacilli.

Rest is a great thing in tuberculosis for the better the rest, the better the chance of recovery. When the patient is run down he should be given complete rest. Of course, absolute rest cannot be given so long as the body has to perform its own internal functions. But beyond that, every little bit of energy saved may be a brick laid for building up a defence foundation for the patient.

When there is no exercise the food requirements will be less and therefore it will mean less work for the stomach and therefore better digestion. The effect of rest in tuberculosis is wonderful. It brings down the temperature and minimises other distressing symptoms. The rest to be effective in tuberculosis must be the rest of a *yogin*. Not only should the body be in repose but there should be mental repose. Mere physical rest will mean little if the mind is kept worried about this or that. In disease, it is particularly difficult to keep mental calm specially in tuberculosis. When an earning patient has to withdraw from his work and create a new financial position having ceased to earn, the desire to go back too early, to get well quickly is a handicap to enjoyment of rest and therefore to recovery. The mind should be undisturbed and the patient must cultivate the habit of taking things and even his illness in a calm and cheerful spirit of resignation. He should cultivate the will to get well. Without this

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strong desire to get well it is difficult for a patient to tolerate the restrictions put upon him whereas the ideal mental pose would be not only to tolerate but to remain cheerful and happy.

Profound sleep gives profound rest and the tuberculous patient must have as large share of sleep as he can conveniently manage. Sleep is the profoundest form of rest and the tubercular patient needs more than the usual hours of sleep. By work persons produce toxins, these react upon the nervous system causing less flow of blood. A time comes when the brain becomes slow to respond to call of work. Less blood goes to the brain and this produces sleep.

Apart from general rest of the body, another method of giving direct rest to the lungs is employed. The lungs expand and collapse with the inspiration and expiration. This can happen because between the lungs and pleura there is no pressure of air. If outside air is admitted into this space of the lung it cannot expand or it is thrown out of action. This is surgically brought about by a process called artificial pneumothorax. Only a skilled surgeon can undertake such collapse of the lung. The patient in some cases progresses wonderfully towards recovery.

Rest is not to be considered alone. There should be graduated bodily exercise along with rest. As soon as the patient is able to perform movements without strain, he should begin to take exercise.

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To the diseased lung, exercise means greater work. Ordinarily exercise or greater work will put more blood into circulation. When the lung is in advanced stage of tubercle formation, it will yield a portion of tubercle bacilli to the blood. The greater circulation through lungs will mean greater loading of blood with bacilli. This increases toxic condition of blood and helps the progress of the disease. Hence rest is necessary. When however by taking rest the conditions are a little altered then some exercise is necessary. Without exercise the circulation becomes sluggish, the stomach does not work and cannot deal with sufficient food to give greater nutrition to the body under the improving condition. Then it is that some exercise is necessary.

Walking is the best form of exercise. After taking exercise the temperature should be noted. Exercise should not raise the temperature more than temporarily, otherwise the amount of exercise should be reduced. In this way gradually more and more exercise is to be taken till without a rise of temperature, a patient can put in 10 miles of walk daily. When a patient has attained this stage only then can the question of resuming to normal occupation be thought of.

Climate is a matter of consideration for the tuberculous patient. Dry warm climate is good. But too much stress should not be put on climate. It is not possible for the poor to change to a better climate. Let not a patient feel that he cannot get

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better without a change Tuberculosis can be got rid of in the climate in which it was acquired There are so many factors which influence the progress and cure of the disease that undue stress need not be given on any particular item.

Tuberculosis is a disease for which we have no specific remedy There is no medicine, vaccine or physical treatment about which we might say that this drug or this method does not fail in tuberculosis No, we have no medicine and no measure about which this can be said For cure of tuberculosis we have therefore to depend upon improving the general condition of health and removal of toxin by healthful living Such life increases resistance and increases the patient's chance of recovery Having discussed what those points of increasing resistance and vitality are, we shall pass on to the consideration of the treatment of tuberculosis and its various symptoms medicinally.

Medicines in Tuberculosis —The disease comes by the air passages and through the blood stream Rationally these two channels are therefore used to counteract the action of the bacilli.

Inhalation of antiseptic vapour through the atomiser, the respirator and by hanging pieces of linen saturated with the antiseptics in the room are the methods. Creosote, eucalyptus and iodoform may all be inhaled in this manner. Antiseptics have been found to be useful in arresting the progress of the disease and in healing to some extent.

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Iodine is supposed to be a powerful agent in checking the progress of the disease. Iodine in the form of iodoform may be used for inhalation or as an ununction and may also be taken internally in $\frac{1}{2}$ grain doses dissolved in oil or in capsules three times a day. Iodine can be very well introduced into the blood stream through intravenous injection. The best effect of iodine may be obtained by this means. Two injections of 1 c.c. of .37 grain of iodine are a good measure.

The next antiseptic in general use is creosote or its derivatives guaiacol and thiocol. Creosote may be inhaled as vapour. It may be hung from saturated pieces of linen and may be taken internally. Advocates of creosote treatment desire to have the whole system saturated with creosote. It is best to begin with a small dose and increase it considerably as the patient tolerates. 20 minims can be given daily in several doses. Creosote in oil 1:10 if injected into the trachea by hypodermic syringe has been found to give relief to obstinate cough.

Arsenic has been highly extolled in the treatment of phthisis. 1/60th grain may be given twice a day after food and the dose increased gradually till intolerance to the lungs is exhibited. This consists in development of great weakness in the extremities and lassitude after walking. The doses have to be reduced and then again increased. Some consider that there is no single drug of equal utility in the chronic form of phthisis.

Fever.—Fever is an index of the toxic action and of the break-down of resistance. Indeed most of the remedies of phthisis are tested by the thermometer. In phthisis the skin temperature is no index. Best is rectal temperature and failing that, temperature of the mouth is to be taken by keeping the thermometer under the tongue. Most of the general and antiseptic remedies described when effective, help to bring down temperature. Quinine is of value as an atipyretic in phthisis. A combination of quinine, calcium and nux vomica in small doses is useful in night sweats.

Night Sweats.—Patients subjected to open air treatment have this rarely. Datura (belladonna) is well-known for its power of arresting secretions. When night sweat is not due to bed clothes or exhaustion but is a symptom of accompanying fever, a grain or two of datura may be given daily. When night sweat occurs the patient should be sponged, night clothes changed, a warm alkaline drink given and all windows kept open at night.

Cough:—Proper treatment of cough should take a prominent place in dealing with phthisis. The cough may be for expectoration or simply due to irritation or combined cough of expectoration and irritation.

So long as cough is attended with expectoration, the soothing effect of opium should not be attempted for then the expectoration will diminish and make the cough more tenacious.

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The morning cough of tuberculous patients is almost invariably the cough of expectoration. During sleep the catarrhal secretions accumulate and on waking have to be expelled. The best method of dealing with this morning cough is to help it to come out by use of warm alkaline drink containing soda bicarbonate. Warm soda bicarb solution promotes expectoration by its solvent action on the mucus. A little common salt may be conveniently added to the warm water. Vasaka is a great soother and helper of expectoration. A few tablets taken at bed time and early in the morning are likely to be useful in several ways.

Where after expectoration the irritating effects still remain inducing dry cough, inhalation of a drop or two of chloroform is very helpful.

When there is evidence of existence of dry pleurisy, counter irritation will often be found to be very useful. Counter irritant may be given in the form of tinct iodine paint or small bits of mustard plaster on the affected part of the chest. Potass bromide is a useful thing in relieving irritating cough. And when nothing is helpful then there is opium left to work.

Vomiting — Vomiting on taking food is a troublesome incident in tuberculosis. In order to avoid paroxysms of vomiting it is advisable to clear the bronchial passage by taking a warm drink half an hour before meal. This keeps down irritation and is likely to be effective. The will not to cough is a great factor in controlling the fits of

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irritating cough. If the cough and vomiting after meal are suspected to be due to gastric troubles then the meal should be preceded by a dose of bismuth salicylate and a few drops of dilute hydrochloric acid Nux vomica also helps to keep the stomach in tone and reduce irritation

Hæmoptysis —It is believed, that in open air treatment it is remarkably less frequent In the last stage of tuberculosis where there is sudden rupture of the ending of a pulmonary artery, the matter is serious and no medicine can be relied upon to stop such bleeding. But congestive hæmoptysis which often occurs, generally gives a gush of blood followed by expectoration of blood for a short time, generally cures of itself. Indeed hæmoptysis is a self-curing disease. There are cases in which a certain amount of hæmoptysis is more useful than injurious. It washes out some of the virulent bacilli and checks the rapidity of progress of tuberculisation

Bowels should be kept moved by two drams doses of mag. sulph purgative and the food should be cold and light and absolute rest should be given for sometime

In weak and run-down patients sometimes slow hæmoptysis goes on protracted, it is difficult to do much by way of medicinal treatment in this case. The patient should be kept perfectly quiet in bed, light food should be given and the patient should avoid all mental excitement Turpentine is of some value in arresting hæmoptysis. Chloroform may be

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inhaled. Common salt is supposed to arrest haemoptysis and is given as a drink.

Intravenous injection of calcium chloride 10% solution in 2 to 5 c.c. is recommended in obstinate cases in order to increase the coagulability of blood. Calcium lactate 20 to 30 grains doses three or four times a day by mouth should be given. Milk may be injected hypodermically in the gluteal region. If the bleeding is severe and the patient cannot be calmed a hypodermic injection of morphine hydrochloride $\frac{1}{4}$ gr. should be given immediately.

Digestive Troubles — Loss of appetite so common in tuberculosis is remedied by open air life, rest and regulated exercise. Nux vomica and soda bicarb are helpful in atonic condition of the stomach. If there is dyspepsia, bismuth salicylate should be given and to improve digestion, a few tablets of papaya and kalmegh will be useful.

Constipation should be remedied by application of douche and mild aperient action of myrobalans. Creosote, calomel, opium, thymol and lime water are very useful in diarrhoea of tuberculosis.

In diarrhoea the diet should be reduced, whey, butter milk, barley water, green cocoanut water, tomato juice should be given. Vitamin foods should be supplied.

Tuberculosis of Various Organs

The organs of the body are variously affected by tuberculosis. In adults the lungs are the principal

seats of infection. In children the lymph glands, bones and joints are mostly affected. No organs are however exempt from the attack of tuberculosis and the disease assumes different characteristics according to its seat. Lungs are the general seats of the disease but one or many organs with or without the lungs may be affected. Pericardium, peritoneum, pleura, meninges, brain, spinal cord, liver, spleen, bladder, lips, tongue, tonsils, adenoids, oesophagus, stomach and intestines, the heart, generative organs, bones, the spine, the skin etc. are all affected by tuberculosis, each showing characteristic symptoms. We occasionally call the disease by different names according to the seat. But the disease is one and same.

1. Tuberculosis of Lymph Glands :—Scrofula is a tubercle of lymph glands. Tubercular inflammation of lymph glands is common in children, old men but it is met with at all ages. Catarrh of the mucous membranes is a predisposing cause. In nasopharyngeal catarrh the tubercular bacilli may find an easy lodgment and being taken up by lymphatics may pass on to the nearest glands.

Scrofula is local in character. The glands of the neck or those of the mesentery may alone be involved. It has a tendency to spontaneous healing. The struggle between the bacilli and the power of resistance is long and protracted and eventually the protective forces get mastery but at any weak moment acute tuberculosis may establish its hold. The

TUBERCULOSIS IN VARIOUS ORGANS

tuberculous inflammations have a tendency to suppurate, particularly in the glands of the neck or those under the axilla. These become prominent like nuts with a slippery skin. The mesenteric lymph glands may be infected with tuberculosis. It is the abdominal scrofula of the old writers. It may be primary affection or it may be secondary from tuberculosis of the intestines. The involvement of glands interferes seriously with nutrition and the patients are dwarfed, wasted and anaemic. The abdomen is enlarged and tympanitic diarrhoea is a constant feature. The stools are thin and offensive. There is some fever and the general wasting and debility are most characteristic. These cases are often known as tuberculosis of bowels, but in a majority of them the intestines are not involved. The peritoneum may be involved.

2 When tuberculosis affects the serous membrane it gives rise to inflammation. When the pleura is attacked, acute, subacute and chronic types of tuberculous pleurisy may appear. In acute cases pleurisy sets in abruptly with pain in the side, fever and cough. There may be nothing to suggest a tuberculous process and the patient may be possessing a good health and body and may have no hereditary taint. In subacute type the onset is insidious and the true character of the disease is often overlooked. These cases often terminate in pulmonary tuberculosis. It may even take up the miliary form.

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3. Tuberculosis of the Liver :— This organ is often involved in attacks of miliary tuberculosis. Occasionally large single tubercle forms on the liver. The organ may be enlarged by numerous caseous masses and may present the clinical picture of tender enlarged liver or jaundice.

4. Tubercl bacilli may attack the brain where it may appear in the form of miliary infection causing meningitis or tubercles may form exhibiting symptoms similar to those of tumour in the brain.

5. When tubercular bacilli infect the mammary gland, the breast frequently becomes fissured or cracked and the nipple is retracted. The fistulae and ulcers present a tuberculous aspect. The disease runs a chronic course for months or years.

Meningitis and Tubercular Meningitis

Meningitis :— Meninges are membranes which line the brain and the spinal cord. In meningitis these are inflamed. The disease is due to the action of a micro-organism *diplococcus intracellularis meningitidis* which is found in the secretions from the nose of the patient. The onset is sudden accompanied by rigor, headache and vomiting. The temperature is not high being 101° or 102°F. One of the most striking features is that the neck is stiff and the head may be drawn back on account of the contraction of the neck muscles. Muscular tremors

MENINGITIS : TUBERCULAR MENINGITIS

may occur and unconsciousness comes on quickly. Sometimes unconsciousness is preceded by a period of delirium Cutaneous eruptions in the form of herpes or rashes are very common The patient may pass off without regaining consciousness or in favourable cases the temperature may subside and gradual recovery takes place At the onset there is usually severe vomiting and bowels are generally confined

Treatment consists in taking general measures to soothe the patient Light is not tolerated Hot baths do great good The bath may be given at a temperature of 107° to 110° F Two hot baths may be given daily These baths reduce temperature and abate restlessness and pain After the bath the patient may freely perspire and fall asleep Lumbar puncture has been strongly recommended for relieving pressure Anti-meningitis serum is specific Of medicines both potass bromide and potass iodide have been highly extolled Ice bag is to be applied on the nape of the neck irrespective of temperature Constipation is to be relieved by douche Diet need not be considered here Morphine should on no account be given in meningitis.

Tubercular Meningitis — Tubercular nodules surrounded by inflammatory exudation are formed in the meninges of the brain and the spinal cord The temperature rises to 101° to 103° F and the onset is like an ordinary meningitis There is loss of consciousness, frequent grinding of the teeth and

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the pupils are dilated and non-responsive to stimulus. In further development the neck is drawn to one side.

Treatment should begin by administration of large doses of potass iodide. The other remedial measures also are the same as in the case of non-syphilitic meningitis.

Meningitis is carried from person to person through the exudations from the nose. It appears as an epidemic form in certain localities. On the occurrence of an epidemic, crowded places like schools and markets should be closed to prevent spread.

CHAPTER—XIV

DISEASES OF THE CIRCULATORY SYSTEM

Diseases of the Valves

The four chambers of the heart have four sets of valves and these valves may be deformed or may be constricted or may be leaking. Many diseases may injure the valves of the heart. Rheumatism, gout, syphilis, infective diseases and alcoholism all may cause diseases of the valves of the heart. Severe muscular labour may also injure the heart.

The effect of the deformity in valves or obstruction about them is diminution in flow of blood to the lungs or to the arteries. The system demands a certain flow of blood. When the heart fails to meet this demand on account of the above defects, it tries to compensate for the deficiency by extra work. When the heart establishes an equilibrium between demand and supply of blood in spite of the diseased condition, then the circulatory system is said to be compensated. But when the deficiency cannot be made up even by extra work, it is known as an uncompensated system or an uncompensated heart. In order to make up for the deficiency the heart allows its cavity to be increased or becomes more or less dilated which by itself is a diseased condition.

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When the deficiency is small some dilatation may do, provided the muscles of the heart put in enough energy to force out the blood. The heart is then a dilated heart. It may so happen that the muscular force is not enough. Then there is the call for increasing the size of the heart to meet the increased call for performance. The increase in size of the heart is called hypertrophy which is the name of another diseased condition. For a time hypertrophied heart may continue to give compensated service and maintain circulatory equilibrium but hypertrophied heart is an abnormal heart and its muscles are liable to be degenerated. When this happens and the compensation fails, it is then a failing heart and those symptoms that are dependant on loss of circulatory equilibrium make their appearance. Again in dilatation of the heart the cavities may become too big without the valves becoming proportionately larger. Therefore without organic defects incompetency arises there.

But hypertrophy and dilatation of the heart may be caused independently of disease of the valves. Habits of life and constitution may cause hypertrophy of the heart. High arterial tension causes increased work for the heart which then hypertrophies. Circulation in the lungs may be obstructed by pulmonary disease and cause increased work for the right ventricle which ultimately leads to hypertrophy. This sort of hypertrophy is beneficial for it is compensatory.

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CONSEQUENCES FROM DISEASED VALVES

These diseases are structural or relate to the condition of the organ. There are other diseases which are functional in which the heart fails to function properly. Functional diseases may co-exist with diseases of the valves or muscles of the heart.

Consequences from Diseased Valves

To distinguish the different diseases of the heart requires high skill and trained ear to judge about the sounds. But apart from the heart sound, the consequences of heart disease may point to what is wrong with the heart.

When the mitral valve fails to work properly and the failure is not properly compensated then there is disturbance all throughout the chambers of the heart. The pulmonary veins cannot empty themselves fully into the chamber, so there is sluggish flow of blood from the lungs. The lungs get congested and the pulmonary artery cannot discharge fully its contents into the lungs. This creates back pressure as the main veins of the system cannot empty themselves fully into the right heart. The result of this obstruction depends upon the extent of injury. There may be only mild symptoms but very serious consequences may follow.

With failure of veins to discharge into the heart, the following consequences may follow:

Dyspnoea, cough, haemoptysis, enlargement of the liver, commonly known as cardiac liver, gastritis,

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constipation, scanty urine, albuminuria, cyanosis and dropsy.

Then again when the aortic valves fail and the failure is uncompensated, blood will not be forced into the arteries with normal pressure. The result will be defective work all along the pressure side or arterial side of circulation. This is characterised by pallor of face, cerebral anaemia, palpitation, pain and dyspnoea. Dizziness and tendency to faint are observed specially in any sudden change of position, in getting out of bed etc. The pain is confined not only to the heart but may extend to the neck and down the arms to fore-fingers, particularly on the left side. Frequently this defect of the heart is associated with angina pectoris. Sometimes oedema may appear and prove to be troublesome. Paralysis, haematuria and enlargement of the spleen are other consequences. Death is often sudden.

In all these cases to be generally classed under failure of compensation, the direction of treatment should be towards restoring the heart muscles to their normal active condition. And the most primary thing is to give mechanical rest to the heart by making it work only to least requirement for maintaining the body. Often a forced rest on bed for two or three weeks will achieve marvellous results. The irregularities, the congestion, difficulty of breathing and even dropsical condition, all these may disappear. Nature is a great healer and in the case of heart, rest is a royal road to cure. With every break-down of heart there is increased over-balancing of compensation

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and this has to be considered in enjoining strict rest for bringing about a condition of restoration.

Next to rest comes diet. Diet should be so regular that no digestive troubles may arise and toxins generated. A weak heart means weakened circulation which again means weakening of the power of digestion. A long interval should be given between meals to enable the enfeebled stomach to function leisurely. Some recommend protein foods in heart diseases in preference to carbohydrates. The bowels should be kept moved, if necessary by daily use of a douche.

Next we shall turn our attention to some drugs which have been proved to be reliable. Digitalis is one of the oldest and most reliable in the line. The leaves of the plant may be powdered for administration and in this form leaves keep their potency for a long time uninjured. Digitalis makes the muscles of the heart strong and as a consequence the contraction of the heart becomes more vigorous, the pulse becomes strong, slower and more regular. There is a prolonging of the diastole which ensures better emptying of the veins into the right heart. Digitalis gives tone to arteries bringing them back to normal functioning. In cardiac dropsy all round good follows the strengthening of the heart by digitalis. There is greater pressure on the kidneys and therefore less chance of serious fluid accumulation causing dropsy. Digitalis should be given after a purgative has drained away the accumulated debris of the system. There is

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an opinion that digitalis acts as a cumulative poison. But the direct evidence of many eminent physicians contradicts this statement. It however is regarded as causing gastro-intestinal irritation. Its use therefore may be suspended for a few days after a prolonged course. When the muscles of the heart are in an advanced stage of disintegration digitalis may fail to improve conditions, it would then be useless to continue its administration. When there is already an increase of blood pressure, digitalis may be given in very small doses and may be usefully combined with dilators of blood vessels like garlic.

We have now in arjun a drug which is fully equal to digitalis. It is not a poison like digitalis and does not irritate the stomach and all the good actions of digitalis are in it. It acts as a cardiac stimulant. It increases the force of contraction and prolongs the diastole. It is quicker in action than digitalis. Arjun bark powder in tablet form if kept on the tongue for a little time gets absorbed and its reaction becomes apparent on the pulse. Arjun cannot be too highly extolled in heart diseases. In fact, it may be regarded as a specific.

Arjun bark powder may be given mixed with tepid milk. It does not make the milk disagreeable. Caffeine is also a good cardiac tonic. It stimulates both vasomotor centres and the heart muscles. It raises the blood pressure and stimulates the heart, 30 grains a day may be given to obtain the best results. It has a direct action on the kidneys.

TREATMENT IN DISEASES OF THE VALVES

Nux vomica and quinine are cardiac tonics and are useful in cardiac dilatation combined with weakness of muscles. These act indirectly and then react on the nerve centres.

Iron is another article of prominence in diseases of the valves. Iron may be given in the form of ferrous sulphate combined with arsenic and juice of green leaves.

When the compensation of the heart has been restored, period of rest in bed may be reduced gradually and gentle walks on level ground may be undertaken.

Some cases of cardiac failure are accompanied by symptoms of dyspnoea, cyanosis, haemoptysis, gastro-intestinal catarrh, jaundice, albuminuria and dropsy. The main source of trouble being the heart, attention should primarily be confined to the heart for treatment.

If there is pressure in blood but at the same time due to back pressure veins cannot empty leading to cyanosis, a little bleeding may do great good. 8 or 10 ounces of blood may be let out with excellent results. Leeches may be applied. But in cases of venous obstruction drastic purgatives are of benefit. Free purgation should go hand to hand with stimulation of the heart. The removal of portal congestion leads to relief of congestion in the liver assisting in healing of gastro-intestinal catarrh and helping in the assimilation of food. Ascites and general dropsy may

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be greatly diminished, if not wholly removed. Magnesium sulphate is on the whole best purgative in 4 to 8 drams doses once a day.

Any way a patient with cardiac trouble should not be allowed to be constipated as constipation increases tension of abdominal vessels and therefore calls for increased work from the heart.

In cases of respiratory trouble relief should be given to the patient by making him sit up in an inclined position and preventing continual slip by putting a circular ridge under the hips which may be tied to the cot.

Hæmoptysis, if not dangerously prolonged needs no special attention. In cases of dropsy the serous fluid may be thrown off by diuretics through the kidneys by the use of purgatives or by paracentesis. Punarnava is good diuretic combined with such medicines as arjun and caffeine for increasing the action of the heart. When these measures fail, the fluid has to be removed by paracentesis. After taking antiseptic precautions the fluid may be drained through a canula by a puncture through a trocar. The patient should be kept in a sitting position and pressure applied to effect drainage. But the whole of the fluid should not be drained in weak subjects all at once. Some fluid should be left over. When there is excessive accumulation of serum in the feet, the skin may be scratched with antiseptic precautions in order to lefft off the accumulation.

TREATMENT IN DISEASES OF THE VALVES

After the accumulated serum is removed diuretics and purgatives work better leading to restoration of health.

Massage is very useful in relieving the oedema of the extremities and sometimes of ascites also. The venous circulation is helped by compression and stroking to the direction of the heart. Massage all over the body is invaluable and oedema of feet and legs may be thus caused to disappear.

Sun bath and cold bath have healthy effect on the system. Cold water bath is particularly beneficial to weak heart. The patient may sit in water up to the neck as long as he can conveniently do so.

Prescriptions .

Arjun— $\frac{1}{2}$ dram or 6 tablets. One dose 4 to 6 times during day and night to strengthen the heart.

Garlic— $\frac{1}{2}$ dram juice or 5 tablets 1 dose. 3 such doses to reduce blood pressure.

Caffeine— 5 grains or 1 tablet 1 dose 3 to 6 doses daily according to the necessity of raising blood pressure.

Nux vomica— 2 grains or 1 tablet for a dose twice daily.

Ferrous sulphate— 5 grains 1 dose with green juice of any edible leaves for iron deficiency.

Magnesium sulphate 4 to 8 drams. 1 dose. Once daily in accumulation of serous fluids.

Punarnava— $\frac{1}{2}$ dram or 5 tablets per dose four times a day for diuresis.

Palpitation

Palpitation is an irregular or forcible action of the heart perceptible to the individual. Usually healthy men are unconscious of the heart beat. In palpitation the patient becomes conscious of the beat of the heart. There is increased rapidity and force of cardiac contraction. Occasionally the whole body may shake with the throbbing of the heart. There is a sense of oppression and discomfort, a heaviness in the head or giddiness or faintness. Even there is a feeling that death is approaching.

Palpitation may be due to the exhaustion of the muscular force of the heart. In feeble and excitable persons emotional disturbances induce palpitation. Anæmia and other exhausting or debilitating factors may cause palpitation. Excessive mental labour, sleeplessness, hysteria, sexual excitement and also dyspeptic states and flatulence are all responsible for palpitation. The abdominal nerves may be irritated by concretions of faecal matter and this irritation may appear as a reflex action in palpitation. In flatulence and dyspepsia, over-distension of the stomach may cause pressure on the heart and bring in the distressing state of palpitation.

Palpitation attended with constipation is often of this kind. The heart has to overcome a normal obstruction and whatever lessens the obstruction may cause palpitation. Alcohol, exposure to excessive heat in hot baths may cause palpitation.

PALPITATION . ANGINA PECTORIS

In dealing with palpitation the cause must be sought out and if possible removed. When there is emotion, this must be subdued and when it is due to debility, appropriate tonics should be given. If due to excessive work, rest should be given. Medicines should be given where dyspeptic state, flatulence and constipation cause the trouble. Regulated exercise and free exposure to open air are conducive to restoration of normal state of the heart. Meals should be regulated and nothing should be given in between the meals. In cases of anaemia nux vomica, iron and arsenic are useful.

When there is gastric catarrh associated with palpitation, gastric sedative and antacid should be given such as bismuth salicylate and soda bicarb. Constipation should be removed by use of aperients. In sudden attacks of palpitation chota chandra in doses of 30 grains will be found useful. Pot bromide in 15 grains doses three or four times a day soothes the nerves. Occasionally an attack may be cut short by drawing deep breath, a number of times.

Cardiac Pain

In cardiac pain known as angina pectoris, the patient is seized with an intense pain in the region of the heart. It is accompanied by a feeling of constriction of the chest. It is felt as if the chest is within an iron grip. The pain shoots to the back and goes down the left arm. The patient experiences extreme torture as if death is near. The face becomes

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pale and the hands are cold. The pulse may be irregular but it also may be regular. Sometimes the tension is high. The attack may last a few seconds or a few minutes or even longer. As the attack ends there is relief with some eructation of gas and copious discharge of urine. Dyspeptic states, errors of diet, flatulence etc. induce the attack. The attack may be repeated at intervals.

High blood pressure accompanies an attack. The increased blood pressure may be the cause as well as the effect of the attack. The attack may be so severe that the power of resistance may exceed and the patient may succumb. One may struggle successfully with earlier attacks but as the exhaustion increases, death may follow.

A person subject to anginal attacks should avoid all strains, physical and emotional so that cardiac exhaustion may be relieved. General nutritional condition should be improved.

If there is any intestinal trouble such as flatulence or dyspeptic condition, it should be relieved. Tea, coffee, tobacco, alcohol etc. exert a toxic influence on the heart and should be avoided. The intestinal canal should be endeavoured to be kept free from toxins. Gout and rheumatism should be attended to and constipation removed. Cardiac tonics should be given as preventive and during attack sedatives should be given.

In some cases exclusive milk diet does good. In any case excess of starchy food should be avoided. Light exercise combined with light, easily digestible

ANGINA PECTORIS

and nutritious food should be taken. Massage, sun bath and cold water bath are helpful in keeping off the dreadful paroxysms.

To remove dyspepsia alkaline antiseptics should be taken. Intestines should be washed daily with a douche. Papaya milk 10 drops or 2 tablets helps digestion and should be used in intestinal and digestive troubles twice or thrice daily. Soda bicarb, nux vomica, kalmegh and creosote are good for securing relief from flatulent condition. One dose of myrobalan 1 to 3 fruits or 9 tablets at bed time is advisable in keeping the bowels open and also for maintaining a sound bacterial condition of the intestines. Gout and rheumatism should be attended to in the manner dealt with under these heads. The principal thing would be the ensuring of removal of waste products through the skin, the kidneys and by free purgation. Moderate quantities of food should be taken. Bath will help elimination through the skin.

In anaemic cases and in cases of temporary cardiac debility from malnutrition, iron and arsenic combined with strychnine after food should be given during intervals to prevent attacks. When angina pectoris is associated with degeneration of the heart or gout, potassium iodide is very useful. It stops cardiovascular degeneration, stimulates the glands and promotes elimination. It is an efficient antineuralgic agent in several forms of nerve pain.

Now we shall consider the steps to be taken during paroxysms of attack. The one great thing

DISEASES OF THE CIRCULATORY SYSTEM

in treatment is to reduce arterial tension. This may be brought about by nitrites in the forms of amyl nitrite, sodium nitrite and nitroglycerin and garlic.

Amyl nitrite is given as inhalation. This is put in glass capsule containing 2 to 5 minims. The capsule should be broken in a handkerchief and inhaled. It is not an absolute remedy and in some cases it may entirely fail to relieve. One per cent solution of nitroglycerin in 1 to 2 minims doses given at short intervals during an attack is useful. In the intervals it may be taken three times a day. Large doses of amyl nitrite bring in excessive headache. Sodium nitrite is also very useful in $2\frac{1}{2}$ grains doses repeated during the attack. It is besides said to have a more lasting effect than either amyl nitrite or nitroglycerin. During paroxysms if the extremities are cold, hot water bottles should be applied to warm up. Sometimes nitrites will fail as they often do. Then inhalation of chloroform should be resorted to. Some have found chloroform to act more quickly and effectually than amyl nitrite and is perfectly safe. Some absorbent cotton or cloth may be put in a wide mouth phial and chloroform poured in. It is inhaled and as soon as there is narcotic effect further inhalation may be stopped. Relief may be obtained in a few seconds. Garlic juice may be given, where possible. Arjun should be given in full doses to strengthen the heart.

Deep breath cuts short paroxysms. Therefore free access of air should be given and deep breathing continued. In cases of repeated and severe attacks,

ANGINA PECTORIS ARTERIO-SCLEROSIS

opium by mouth or hypodermic injection of morphine hydrochlor gr $\frac{1}{8}$ to $\frac{1}{4}$ should be given It is well tolerated in cases of heart affections Small doses of nux vomica may be given to counteract any depressing effect Counter irritant such as mustard plaster has its use at times and repeated small bleedings from the arms have been found to correct blood pressure

Prescriptions

Papaya milk—10 drops or 2 tablets. 3 to 5 times daily

Soda bicarb—15 grains or 2 tablets for indigestion

Garlic juice— $\frac{1}{2}$ dram or 5 tablets. 6 times during day and night.

Sodium nitrite—2 to 3 grains dose 3 times daily for reducing blood pressure.

Potass iodide—10 grains or 2 tablets Once to thrice daily, when accompanied by gout.

Opium—in 2 grains doses or morphine injection to relieve repeated paroxysms

Myrobalan—1 to 3 fruits to avoid constipation

Disease of the Arteries

Arterio-sclerosis is a degenerative disease of the walls of the arteries The degenerative changes may cause excessive blood pressure by blocking up the passage for free flow of blood The degenerative changes may be the effect of high blood pressure also In old people, the continual wear and tear of the arterial tubes over long years brings in the degeneration but some may prematurely fall a

victim owing to the inherent defect in the make-up of the arterial tubing

Excessive physical strain in persons living on hand or manual labour or strain in athletes when it exceeds beyond the safe limit, may cause these changes. Poisoning of the blood by irregular habits of dietary or excessive drinking may also cause this condition. Some diseases such as syphilis, rheumatism, gout etc. may cause sclerotic condition of the arteries.

Diet should be regulated and also habits of life so that a peaceful undisturbed condition of body and mind may be attained. The bowels should be kept freely moved. For this purpose myrobalans may be very helpful. Food should be limited to the minimum requirement.

Arterial degeneration may be induced by the absorption of poisons created by the activity of bacillus coli in the system. It was suggested that a change in the intestinal flora by the introduction of the bacilli of sour milk may be of use. Much experimental data are not available on this matter.

Meals should be small and taken slowly after thorough chewing. Green vegetables and milk should receive the first place. Both carbohydrates and proteins should be taken in minimum quantity. Alcohol, tea and tobacco should be given up and sexual excitement should be guarded against.

The tension of blood in arteries should be removed even by blood letting. Pricking the mucous membrane of the nose with sharp saw-like teeth of

ARTERIO-SCLEROSIS ANÆMIA

sharp toothed fishes is a good method for blood letting. Leeches may be applied. Attention should be principally directed towards keeping the body free from poisons and from over-feeding. Bowels should be kept freely moved so that no poisons may accumulate in the system.

Nerves may be soothed by bromides and the heart kept stimulated by potass iodide and arjun. When the pressure of blood rises high the cause should be sought after and removed. Invariably some toxic action will be traced to be going on when the pressure is high. As a general measure sodium nitrite may be given to tide over temporary excess of blood pressure. Starvation or considerable reduction of food is also a good measure in emergencies. A temporary milk diet proves very useful in some cases as it promotes diuresis.

Prescriptions

Garlic— $\frac{1}{2}$ dram to $\frac{1}{2}$ ounce dose once or more

Sodium nitrite—2 to 3 grains doses for relieving blood pressure

Potass iodide—5 to 10 grains or 1 to 2 tablets. Once to thrice daily for soothing nerves, specially in syphilis, gouty and rheumatic complications

Arjun— $\frac{1}{2}$ dram or 6 tablets 3 to 4 times during day to strengthen the heart

Blood letting to relieve pressure

Anæmia

Anæmia is want of blood or more properly want of red corpuscles or haemoglobin in blood. This may be

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brought about by malaria, hæmorrhage or excessive menstrual discharge. Morbid states such as chronic suppuration, albuminuria, cancer etc. may cause anæmia. Febrile condition and wasting diseases may cause anæmia, then again anæmia may be due to malnutrition, insufficient or unsuitable food or from imperfect assimilation on account of gastric or intestinal troubles. Toxæmia may bring about the destruction of blood and cause anæmia. The common causes of anæmia are malaria and pregnancy.

In anæmia the countenance becomes pale, the nails lose pink colour, digestion is disturbed, vomiting and constipation may appear, the heart may be feeble and there may be breathing difficulty.

Chlorosis is the anæmia of young girls between 14 and 17 and is often associated with sexual disturbances. The onset of puberty and consequent rapid growth and development are determining factors. In chlorosis the complexion takes a yellowish green colour, there is pigmentation about the joints, the eyes become particularly brilliant. Digestive troubles, oedema of feet accompany chlorosis. The fat being retained, the body appears to be plump.

For treatment of anæmia we have first of all to look to diet and general hygiene. Malaria must be got rid of. Easily digestible and nutritious foods should be taken. Milk, cream and butter are good items. Fruits and green edible leaves should be taken in sufficient quantity. We have already seen in the chapter on Nutrition that the green leaves are

ANÆMIA . CHLOROSIS

particularly rich in mineral salts and iron. Anæmia requires a larger supply of iron and we know inorganic or organic iron by mouth must be supplemented by an intake of green leaves or juice from them

Exercise should be regulated according to the state of exhaustion. Massage, sun bath, friction bath with warm and cold water do immense good in restoring tone to the anæmic patients

As for drugs, iron necessarily occupies the first place. It should be given with *nux vomica* and arsenic. Some find bismuth very useful in inducing iron assimilation. The symptoms accompanying anæmia should be dealt with as they occur. Constipation is very generally associated with anæmia and iron salt may also induce further constipation. Constipation of whatever origin should be removed by the use of aperients and douche. Douche alone or aperients alone may fail but a combination is generally very useful. Calomel 1 grain daily in $\frac{1}{2}$ grain doses acts as a laxative as also antiseptic. For aperient action myrobalan is a great help and should be regularly taken.

In cases of acute anæmia following haemorrhage the patient should be kept motionless in bed with head lowered. Hot bottles should be placed round the body and normal saline should be injected to tide over crisis. If the patient is very restless a small dose of morphine may be injected

CHAPTER—XV

DISEASES OF THE NERVOUS SYSTEM

Neuralgias

Generally speaking, neuralgia gives a tingling or uneasy sensation to the part affected before severe pain commences. The pain is confined to the various branches of a nerve or set of nerves and more often than not affects one side only. At particular points, specially at points where the nerve emerges from a bone, there will be a tenderness on pressure. The pain spreads along the course of the nerve, increasing in intensity till it becomes unbearable. Some of these attacks are apt to occur periodically at regular intervals and at the same time of the day. This periodicity of attack is not limited to malarial cases. Movements of the affected parts or mental excitement often induce attacks. Susceptibility to particular neuralgic attacks may last all through life.

For treatment the root cause of the disease must be found. When the pain is due to some sort of pressure, that pressure should be removed. Pressure may be due to outgrowth, tumours, foreign bodies etc. Surgical treatment is often necessary for removing such causes of pressure.

When the neuralgic pains occur in persons with rheumatic or gouty diathesis which very often occurs,

NEURALGIAS

treatment should be directed towards curing those temperaments. If there are deposits on joints they should be removed as indicated under gout and rheumatism. Counter irritants over the seat of pain by flying blisters, iodine paint, turpentine stupe are all useful. Hot salt baths give relief. In rheumatic cases soda salicylate is a very useful analgesic drug. Massage does immense good when patiently conducted and in combination with other remedies. Potass iodide has a special place in these sorts of neuralgia, more particularly of sciatic nerve. If there is any remotest suggestion of syphilis, mercury treatment should be undertaken.

Counter irritation is an approved form of relieving neuralgic pain. Application of liniments, mustard plaster and blistering have their place. Stimulating liniments applied with considerable friction are very suitable for mild cases. One has to be careful about raising blisters for nasty ulcers may follow on account of careless dressing. The dressing on a blister should be applied firmly and immovably.

Long stout needles are pushed deep into muscles with the possibility of relieving some tension of nerve sheath or otherwise locally influencing the condition of the nerve. Several needles are thus introduced in the course of the nerve and in a few minutes withdrawn.

Opium in 1 or 2 grains doses is almost indispensable in treatment of severe forms of neuralgia. A better way is to inject hypodermically morphine hydrochlor

so that gastric disturbance that follows administration of opium by mouth is avoided. To relieve excruciating pain without delay, opium is very necessary. But great caution should be taken in that opium habit be not induced in the patient. It has been found that opium habit has originated in many cases from its use in neuralgia. Morphine injection over the seat of pain in smallest possible doses such as $\frac{1}{8}$ or $\frac{1}{6}$ grain or 1 or 2 grains of opium by mouth only should be given at first.

Datura and aconite paint locally applied often serves the purpose excellently. Aspirin has its own place in relieving neuralgic pain and it has its limitation too. It is a great heart depressant and may cause serious mischief. A mixture of caffeine and aspirin half and one is a much superior article than aspirin alone. Caffeine compensates for the depressant action of aspirin. But caffeine-aspirin should also be used with caution and moderately and an watch should be kept over the heart of the patient.

Intramuscular injection of magnesium sulphate 12½% solution in 2 c.c. may be given in gluteal region for sciatica Iodine is also a very successful recipe in sciatica for direct absorption by intravenous route

Neuralgia of Face, Tongue and Teeth

The fifth cranial or the trigeminal nerve divides out into three sections on each side of the face on leaving the brain. A branch perforates the bone above the

NEURALGIA OF FACE, TONGUE AND TEETH

eye brows on each side, another perforates the cheek bones on either side and a third perforates the middle of each side of lower jaw and then these nerves from the six points branch out in numerous filaments for carrying sensation to the various parts of the face.

When the uppermost pair of nerves is affected there is what is called brow-ache. Sometimes the pain is centred in the eye. The middle nerves on being affected the upper jaw and teeth get painful while affection of the lowest branch of nerves causes pain in lower jaw, the lower teeth or in half the tongue. When all the three nerves of one side are affected exactly half the face or half the head is painful.

In dental caries the pain is first limited to the tooth. When the pulp is inflamed the pain is spread over a part of the face corresponding to the tooth involved. After the pulp is destroyed the local suppuration may start a neuralgia which spreads along the nerve branch supplying the socket of the tooth and later on may spread to the whole system of facial nerves.

When the pulp is affected, temporary relief may be obtained by applying an irritant to the cavity of the tooth such as a mixture of equal parts of creosote, thymol, camphor and arachis oil. The pain may be relieved by other analgesics.

Neuralgia due to inflammation of tissues about may be relieved by painting the gum concerned with tinct. iodine

-- DISEASES OF THE NERVOUS SYSTEM.

Errors of refraction of eyes may cause headache which should be treated after finding out the primary cause. Ear, tongue, nose etc. may be painful and the root causes of these have to be found out for successful treatment

Another form of neuralgic pain of the temple and cheek may accompany malarial infection coming on with the paroxysms periodically. It is relieved promptly by full doses of quinine or arsenic.

Prescriptions .

Potassium iodide—5 to 10 grains doses or 1 to 2 tablets.

Bismuth salicylate—5 to 10 grains doses or 1 to 2 tablets.

Quinine or cinchona—5 grains doses may relieve these attacks.

Tic-Douloureux

Neuralgia of the whole set of trigeminal nerve is a distinct disease. It is a disease of men past 30 and is attributed in its early stage to some local defect such as a carious tooth. By the time the disease fully develops the teeth are gone. Tic-douloureux as the disease is called is characterised by acute pain in one or more divisions of the nerve. Exposure to cold induces paroxysms. At first the intervals between paroxysms are longer becoming shorter and more severe as time passes. The pain starts from certain centres where the nerve penetrates the tissues.

TIC-DOULOUREUX SCIATICA

Pressure upon these spots is sufficient to induce an attack. A light touch, an attempt at movement of the joint or mastication may provoke a paroxysm causing extreme suffering. Firm pressure over the starting point may relieve the pain sometimes. Drugs may give temporary relief Aspirin 5 grains, soda salicylate 5 to 10 grains, potass iodide 5 to 10 grains per dose in a combination may be efficacious but for cure the nerve has to be destroyed by surgical operation

Sciatica

Sciatic nerve passes from the gluteal region through the back of the thigh. Sciatica is pain of the sciatic nerve and is one of the most obstinate of neuralgias. This may originate with gout or rheumatism. Sometimes it may originate with a pressure on the nerve in its course say from pregnancy or from loaded bowels. It arises from exposure to wet and cold in many cases and muscular exertion may also cause it. There is pain along the whole course of the nerve but most painful is the point where the nerve emerges from the pelvis.

Treatment of sciatica of probable rheumatic origin should start with warm baths, mustard plaster and full doses of salicylates. Bowels should be kept freely moved. Potass iodide is useful and may give complete relief even in non-syphilitic cases.

DISEASES OF THE NERVOUS SYSTEM

Rest is of the greatest importance. Counter irritation has a large place in treatment. Intramuscular injection of magnesium sulphate 12½ to 25% solution in 2 c.c. to 5 c.c. deep into the gluteal muscles at several points has been found to be very efficacious in long standing cases where even walking was impossible for months. Pushing in of long needles about the region of the nerve also cures the pain occasionally. Massage has its own place of importance in treatment of sciatica, particularly in rheumatic and gouty forms. It should be gentle at first, gradually coming to vigorous kneading motion with increasing tolerance of the patient.

Headache

Headache may accompany acute febrile conditions. In diseases of the kidneys or in diseases due to poisoning of blood there may be headache. Headache may be due to some disorder in the brain brought about by syphilis. Headache may also be due to digestive troubles, bad food or excessive eating.

Migraine or hemicrania is a type of neuralgic headache which affects one side of the head only. It comes in the nature of a paroxysm. Women occasionally get it during their menstrual period. If there is a predisposition to migraine any irregularity in habit will induce it such as railway journey, work in over-heated rooms, over-exhaustion, emotional excitement and worry. Some dyspeptic symptoms

HEADACHE : MIGRAINE

may occur prior to the actual attack and there may be a feeling of fullness in the head as a premonitory condition. Some again feel cold and chilly before an attack. There may be some disturbance felt with regard to sight. Objects may be seen blurred Visual hallucinations may occur and images of men or animals may be seen

The pain in the head is severe sometimes accompanied by nausea. Occasionally after vomiting the ache begins to abate The disease is often hereditary, particularly in gouty persons

During an attack only light diet such as gruel, milk or dahi need be taken The bowels should be opened by castor oil or myrobalans Alkaline drink, soda bicarbonate one dram to a pint of water may be taken as often as possible Arsenic as a drug is said to be very valuable. Arsenic in 1/60 grain dose three or four times daily after meals may be given Large doses of chota chandra are of service during paroxysms Aspirin combined with caffeine half and one may be regarded as one of the most potent analgesic in this case

Rest in bed, massage, cold and hot baths are useful Hot bath particularly may act as a great soother The patient should be kept in a quiet place in a darkened room and allowed to sleep off an attack.

The leaves of *drona pushpa* have been found to act as a specific specially in that variety of migraine which commences with sun rise and goes off at sun set The leaves are to be made into a paste, to be applied thickly over the affected area before the sun rises.

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Many persons have found relief on the application of this paste when all other remedies have failed.

Counter irritants like menthol and thymol in oil, mustard plaster are common to all forms of neuralgia and they have their place in the treatment of migraine also.

Headache may be due to eye strain Wrong glasses, errors of refraction and straining of eyes are fruitful causes of headache. When the focus of trouble is found, it will automatically indicate the nature of treatment. Congestive headaches are due to irregularities of food and drink or from excessive mental labour and worry or from interference with circulation of venous blood or suppression of habitual discharges such as at menopause.

Habits of life should be corrected where there is error. If there is any circulatory disturbance causing congestion, then attempts should be made to remove it. The bowels should be moved freely. If there is any over loading, it should be relieved.

Sharp purging is necessary and cold compress should be applied to the head while feet should be placed in hot water Mustard plaster applied to the nape of the neck is a good method. A thread passed through the skin under aseptic precaution as a counter irritant is said to have proved efficient in removing headache lasting for years.

Palliatives in the form of analgesics and other remedies mentioned with regard to general neuralgia apply to this case also.

TREATMENT OF HEADACHE

Toxæmic Headache :—All headaches may be said to be toxæmic. Uræmia, malaria, gout, rheumatism, diabetes, typhoid, syphilis etc. all cause headache and all these are of toxic origin and the treatment of headache lies in the treatment of the disease itself with the help of local palliatives

Dyspepsia or biliousness gives bad headache. Over eating may cause dyspepsia and consequent headache. Treatment lies in fasting. Abstention from animal food, from over eating and from eating of indigestible substances will remove chronic headache caused by the toxic effect due to those causes. In fact, treatment of headache is the treatment of morbid state on which it depends

Aperients are of great service in the treatment of dyspeptic and similar headaches. Headaches dependent on gouty, rheumatic and syphilitic inflammation of structures are relieved by the use of potassium iodide in large doses. To be effective 15 to 30 grains doses should be given three or four times daily. It has a certain depressing effect on the heart which may be corrected by administering nux vomica in 2 grains doses. Sodium salicylate 15 grains with pot. bromide 10 grains three or four times a day proves very efficacious in many cases of muscular and rheumatic pains.

Headache originating in tooth should be attempted to be relieved by attention to teeth and similarly about eyes, nose and ears. Disturbance in these organs may cause headache. So long as the cause remains

DISEASES OF THE NERVOUS SYSTEM

unattended the headache remains despite the use of best palliatives and counter irritants

Insomnia

Insomnia may arise from physical and mental causes Pain and discomfort from disease, injuries or simply irritation from bodily organs may cause insomnia. Some disturbance of the function of the brain may cause insomnia. Some toxic effect on the brain due to inappropriate food in quantity or quality may induce insomnia

Excessive mental trouble, worry, irritation and emotional disturbance may upset the stable working of the brain centres and cause insomnia. Neurasthenia combines with mental and physical causes in bringing about disturbances.

Just as in headache so in insomnia also, we must search for the root cause and remove it for tackling with it Food habits should be carefully enquired into. Exciting drinks such as tea, coffee and alcohol and tobacco smoking, late at night may irritate the brain and then the remedy lies in regulating the hours of such drinks. Eating late at night is a perpetual irritant to the brain making it work against sleeping. Sleep means rest to all organs. When however food is taken within three hours of the time of sleep, then the brain is called upon to work the digestive organs vigorously while it should be sleeping restfully. If nine at night is the hour for

INSOMNIA

sleep then no food should be taken after 6 P.M. So that when a person goes to bed at nine, he goes with a practically empty stomach and the brain also gets leave from performing vigorous action in the stomach. Those who care to have sound sleep should regulate the hour of their last meal of the day.

Flatulent distension of the stomach, irritation of gastric acidity and upward pressure of the diaphragm on the heart, give rise to sleeplessness which should be corrected. Sleeplessness may be got over by taking a tumblerful of warm water having 30 grains of soda bicarb half an hour before bed time. Digestive disturbances are soothed by this in more ways than can be accounted for.

Habitual constipation leads to sleeplessness. This should be corrected. A daily washing out by a douche is a harmless method and should be tried. Those who suffer from toxic effects of constipation may have a wash out half an hour before sleep.

Exhaustion from malnutrition or insufficient food may be responsible for sleeplessness. Consumption of light nourishing food will induce sleep.

Cold in extremities may cause disturbance. Hot water bottles or bathing the feet in warm water containing some mustard are good methods. Friction is also a way of warming up extremities.

Hot bath relaxes arterial tension and helps to soothe one to sleep, specially in cases of great mental excitement. Massage carefully performed induces sleep. Possibly massage diverts blood from the brain

DISEASES OF THE NERVOUS SYSTEM

to the exercised parts and thus induces sleep. Application of alternate jets of hot and cold water over the spine before going to bed is good. There are other hydrotherapeutic methods for insomnia which should be tried.

Hypnotic drugs come last in the line of treatment. They should be avoided as far as possible. In case of emergency caffeine-aspirin may be given. In very exceptional circumstances morphia or opium may be given to lull the senses to sleep. But these drugs may do considerable injury by creating a habit, so their use should not be a routine thing but should be reserved for exceptional circumstances.

Chota chandra is a specific. In special circumstances a regulated dose of chota chandra may be given. Given in 30 grains doses twice or thrice daily it induces sleep. Pot bromide 15 to 30 grains is of great value in mental irritability. As for opium 2 grains may be enough for inducing sleep according to the subject.

Apoplexy

This is due to cerebral haemorrhage into the substance of the brain or on its surface and consequent rupture of a cerebral blood vessel. The disease comes on suddenly as a stroke. The patient suddenly loses consciousness and power of speech and motion. It comes without any warning sometimes while engaged in some action which requires more than usual

APOPLEXY

muscular effort The patient falls to the ground unconscious and paralysed Sometimes the paralysis comes first then loss of speech and in a few minutes there is loss of consciousness Loss of consciousness is complete and deep. The face becomes lurid The pupils get altered by becoming either small or dilated or the eyes become unequal and insensible. The temperature may be high or low, pulse is full, slow and hard and respiration is slow and laboured. Evacuations occur involuntarily. There is more or less complete paralysis of one side. The head is turned away to one side, the side where rupture has occurred The attack however may come gradually in some cases and sometime may elapse before complete loss of consciousness or complete muscular paralysis is established

Generally it ends fatally The temperature rises reaching even up to 107° or 108°F There is deep coma and death speedily ensues In milder cases the temperature rises less and there is fall on the third or fourth day. Signs of returning consciousness appear The first to disappear being the facial paralysis. Very slowly the patient may get over paralysis

When the patient is found in a senseless condition his shoulders and neck should be raised so that the pharynx may not be obstructed by the tongue No pillow should be put under the head. The patient should not be moved at all If the coma is very profound and the paralysis is general, the case may be

DISEASES OF THE NERVOUS SYSTEM

regarded as beyond recovery and there should be least possible meddling.

It is better to use an enema and clear the bowels with warm soap water. An ice bag should be applied on the head on the side of the rupture opposite to the limbs paralysed. Hot water bottles should be applied to the feet. The bottles must be wrapped with cloth so that no blisters may form. No attempt should be made to put anything in the mouth of the unconscious patient. Rectal feeding may be tried, if the general condition of the patient needs such nourishment. If the mouth is dry it should be moistened with a piece of feather or strip of cloth moistened with glycerin and water. The bladder should be occasionally relieved by a sterilised rubber catheter. In apoplexy blood pressure may be relieved by blood letting. Prominent veins in the anterior elbow joint or near the knee may be incised and the patient allowed to bleed till the congestion of his eyes is lowered. It may be necessary sometimes to apply leeches on temporal regions to relieve cerebral congestion early. Administration of calcium salts is admissible in cases where bleeding is slow.

On the recovery of consciousness delicate care should be taken so that cerebral inflammation may subside and irritation round the clot may be allayed. Light food only should be given. Bowels should be kept freely moved. Mustard plaster on the neck is said to act beneficially. Everything possible should be done to keep blood pressure low. This

EPILEPSY

is dealt with under blood pressure on arteriosclerosis

Epilepsy

Epilepsy is a disease of the nervous system, coming in paroxysms characterised by unconsciousness with or without convulsions

There is a momentary staggering or peculiar sensation, the person then is attacked with a fit. The fit is often preceded by a stage in which the patient gets a premonition that an attack is coming. These warnings are of a very varied nature. They are called *auræ*. There may be giddiness or flashes of light may be seen, noises and sound may be heard, unpleasant odour may be smelt or there may be an unpleasant taste in the tongue. Tender spots may be felt or localised sensation of a vague character may be felt in any part of the body. Or a strange dreamy stage of fear or of dread may precede an attack. Occasionally motor aura may seize and the person may run or begin to rotate.

The attack generally comes on with a scream and the convulsions and unconsciousness set in. On an attack the patient, if standing falls to the ground. Aura or warning may be absent in certain cases and then the patient falls unconscious without any warning. The first spasm sometimes twists the head round so that the patient appears to be trying to look over his shoulder. The eyes get fixed in various

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positions and the pupils get dilated. The face becomes pale and then reddens. The hands are clenched and both hands and feet are convulsively twitched about. Foam issues from the mouth and the teeth are set. There is involuntary passing of stools or urine.

The convulsions may continue for a few minutes or may continue for hours. After the convulsive stage the patient becomes motionless and remains senseless generally sinking into profound sleep. The fit may occur at intervals, it may be of days, months or years. The disease is due to nervous changes.

The patient should be placed on his back and he should be prevented from injuring himself by friction of hands or feet or by clenching of fists. Particular care should be taken about the tongue. The tongue may get locked between the two sets of teeth resulting in severe injury. Every moment it is kept, it is pressed. The teeth should be opened forcibly and the tongue pushed inside and then between the teeth should be put some soft piece of folded cloth to prevent further locking.

The patient's clothing should be loosened and water in spray dashed against the face. This helps in bringing back consciousness. The patient may have soiled his clothing. The body of the patient as well as his clothes should be kept disinfected and in a sanitary condition. Just before the fit the treatment similar to that of angina pectoris should be undertaken. When the patient feels about aura, he may himself smell amyl nitrite or chloroform and may probably

TREATMENT OF EPILEPSY -

ward off an attack Inhalation of amyl nitrite, chloroform or injection of morphine hydrochlor may lessen the convulsive movements and may therefore be used even when the patient has fallen and become senseless Biomides have beneficial effects on the cerebral cortex diminishing greatly the excitability of the cells of the motor areas The patient should be prevented from turning over on his face as the nose and mouth may get buried in bed and cause suffocation and ultimate death. It is not unusual for an epileptic patient to get a fit while bathing in a pond or stream Then, if no one is about, the patient meets his death by being drowned. Epileptic patients should avoid bathing alone in rivers and ponds for there is no knowing when the fit may come A patient has also risk of danger of fire say, while cooking or lighting a lamp.

Treatment of the person in the interval between paroxysms may be called preventive treatment Every attack increases the liability to another attack of epilepsy and therefore preventive medicine has a place in its treatment Hygienic care should be taken and unhealthy and abnormal habits should be guarded against The food should be pure, simple and unexciting Alcohol and tobacco should be given up Too much alkali in blood may predispose one to attacks Betels are taken with lime which is a strong alkali Care should be taken not to take too many betel leaves. The bowels should be kept freely moved and if there is a tendency towards

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constipation, myrobalan 1 to 3 fruits may be taken daily. This will prevent costiveness but will not go to form a drug habit. Sun and water baths should be taken. Warm baths would be preferred if the heart is strong. The patient should take regulated exercise.

In a few cases the administration of sedatives in the healthy period has led to permanent cure. But in certain other cases sedatives give only temporary protection and then become useless. Chota chandia in 30 grains doses 3 times a day provides such a sedative.

The acidosis or alkalosis of blood should be guarded against by regulating diet. Taking of too much alkaline lime salts or too much of acid substances should be avoided.

Hysteria

Hysteria is a disease of the mind. It exhibits itself in emotional disturbances and defects of character which are hidden under an almost unlimited number of symptoms of disease of varied character. The symptoms are all psychical or have their origin in mind.

Occasionally fit of laughing or crying gets hold of the patient. There is another characteristic symptom about the disease. The patient often feels that a ball is rising into the throat and causing chocking. The patient may then get more or less violent convulsions.

HYSTERIA

and lapse into apparent unconsciousness. It is also seen that the feeling of chocking by a ball ends there and the patient becomes unable to eat. Such a hysterical woman starves and becomes emaciated. The convulsive moments may subside quickly or may continue for hours. Sometimes the patient becomes violent and continues to trouble attendants. The patient may be under a fit of pain and his wails and shouts for pain may wearily last for hours. This stage is sometimes ended by a spell of unconsciousness. On the contrary, unconsciousness may be followed by emotional manifestations by abdominal distension and passing of a large quantity of urine. These attacks cause great mental and physical exhaustion. There is no disease that may not be simulated by hysteria. Manifestation of local paralysis is quite common. Paralysis of the legs, of one side, of one limb, of voice, of speech all occur more or less frequently. Anæsthesia, hyperæsthesia, dyspnoea, hiccup and cough are also met with. Disorders of the digestive organs are common. Hysterical affections of joints, specially of the knee and hip have been described by surgeons.

The temperature may rise very high. Cases of hysteria where temperature rose to 108° to 113° F have been recorded. In some cases the rise of temperature has been on one side of the body only.

But the most distressing features of hysteria are the moral and mental perversions of the most serious nature. One characteristic however of hysterical

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symptoms which serves to distinguish hysteria is their dependence upon and reaction to psychic influences

Age of puberty is a predisposing factor. Sexual disturbances and morbid states of sexual organs have a casual influence. Women are more affected than men. Heredity is a predisposing cause. Hysteria may occur in anaemic and those suffering from defective nutrition. It is often also seen in the robust and fatty both female and male persons. Menstrual disturbances, conscious or unconscious sexual excitement are frequently at the root of the attacks.

It is difficult to chalk out a line of treatment for hysteria. In this neurosis every thing may fail and every thing may succeed. As nearly every disease may be simulated it is difficult to foresee and guide as regards diagnosis. All the pain described by a patient is "terrible" and is an exaggeration of that of the real disease. If the skin is touched and there is a simulation of pain the patient screams. But on pressing firmly there is no increase of pain which would be the case, if inflammation and a real disease were present. The face rarely has the expression of a patient having really the simulated disease. There is a peculiar characteristic of hysterical persons and questions are answered abruptly. Family history and general disposition, age and sexual relationship will help diagnosis. The disorder is in the mind of the patient and there is no doubt that the sufferings complained of are more or less real. Hysterical persons may feign and make diseases

HYSTERIA

The cases should be managed hygienically. The body and generative organs should be kept clean and any irritation due to worms etc should be searched for and removed. The patient must be made to see that the condition—the mental condition of the disease has been thoroughly understood and the remedies proposed would be carried out thoroughly, firmly but with kindness. If the friends and guardians of patients can have absolute trust then only the case need be taken up otherwise it would be useless to attempt to treat.

In ordinary fainting fits if a burning feather is presented to the nose for inhalation, the patient feels uncomfortable and wakes up which would not be the case in an attack of epilepsy which it most simulates. A bucket of cold water thrown with force on the face and chest often works like a charm in taking off the swoon. Sympathy will make the case worse. Attendants and relatives should be firm and unsympathetic yet kind. This is the best attitude to be taken up. The patients must be made to understand that although they cannot altogether avoid attacks, they can to an extent guard against seizures.

Asafœtida and other antispasmodics are not of much use in the attacks. But they are undoubtedly useful in controlling some of the minor manifestations. Asafœtida should be given in 5 grains doses thrice daily during intervals. The fits may not come. Cases showing distinct sexual excitement should be given datura. Three grains of dry leaves or one tablet per

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dose repeated thrice daily may calm the patient. Potassium bromide and chota chandra also will be useful. These have sedative action on the cerebro-spinal nervous system. They are anaphrodisiac in action and on that account exercise a calmative influence and prevent attacks. These are most useful in menstrual periods.

In cases of extreme suffering during paroxysms opium may be given. But then there is a danger of heading for morphine habit. Simply distilled water injected when the patient was pleading for morphine in distress has been known to allay pain, provided the patient felt that really morphine was injected.

Hot baths, cold and hot douches on the spine should be taken to improve general tone of the nerves. Massage also is useful in bringing the tone of body and mind to a healthy condition because massage has a soothing effect on the nerves.

Moral or coercive treatment will suffice in some cases of paralysis. Cases are known where the patient comes into the hospital as a paralytic. Accidentally when it was discovered that hysteria was the cause of paralysis then the patient was left to shift for herself and move without anybody's aid. And this the patient did on being forced to do so. Oppenheim mentions a case in which operation on the knee had been decided upon. "She came to me on two crutches and left me in a quarter of an hour without them". But all cases are not cured so easily as this.

CONVULSIONS IN CHILDREN

Hydropathy, massage, fomentation are then of value in curing hysterical paralysis. A narrow strip of blister raised completely round the limb has been found to be curative in hysterical paralysis

When there is sensory paralysis, the patient has to be subjected to quiet unemotional life. The cures are to be made by slow steady hopeful training of will power through everyday efforts. Here caution is necessary not to go to excesses "A case is urged and scolded and teased and bribed and decoyed along the road to health ..this is what it means to treat hysteria". The physician must create intense interest in the patient and must gain his confidence without losing his authority. The patient should be assured of cure.

In young age hysteria is often associated with intestinal worms, indigestion or other alimentary disorders They must be treated first.

Convulsions in Children

In children generally convulsions are prewarned by twitching of the face, sudden starts during sleep, inward bending of the thumb on the palm and doubling of the fingers on them, a somewhat similar condition of the toes and squinting

When the fit comes, the child becomes deadly pale, the features are distorted, the eyes stare and are rolled about, breathing becomes irregular and catching.

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the body becomes rigid and the hands are clenched, hands and feet are thrown on all sides. . . .

.. A child seldom dies in a fit except in spasmotic closure of the respiratory passage due to diphtheria or acute laryngitis.

These attacks may be recurring with short or long intervals and may be one or both-sided occurring at any age below 2 years of age.

The causes are : (1) The onset of some acute disease specially malaria, lobar pneumonia or any other infective fevers, (2) reflex irritation due to constipation, colic, errors of diet, round worms or tight prepuce, earache and teething are also predisposing causes though remote but should not be neglected in the eliciting of the history, (3) high fever, (4) violent diarrhoea and vomiting, (5) anaemia of the brain, (6) congestion of the brain, (7) acute brain diseases such as meningitis etc, (8) epilepsy, (9) rickets with tetany, (10) lastly, there are such cases where no definite causes can be found out.

When the attack is sudden without any previous notable illness, we must consider three points :

- (1) Onset of any acute disease, specially malaria and eruptive fevers with high temperature.
- (2) Rickets or teething.
- (3) Any errors of diet resulting into constipation.

So also the treatment should be based on three principles in (1) treatment of attack, (2) prevention

TREATMENT OF INFANTILE CONVULSIONS CROUP

of convulsions in threatened attack and (3) removal of the underlying causes.

(1) In treating the attacks of convulsions the main programme is to dip the body in warm bath if there be no fever and continuous cold douching on the head. If there be fever, only the extremities may be kept in touch with hot water bottles and cold on head.

(2) For prevention of further attacks bromides and chota chandra should be given. If administration of any drug by mouth is not possible, potass bromide in 5 grains along with glucose solution only may be given per rectum through a catheter. Chota chandra in 5 grains doses may be given to be licked with honey.

(3) As soon as medication per mouth becomes possible, calomel should be commenced early to relieve the patient of constipation. It should be given in fractional doses. Other causations should be treated on their own line.

Croup

Croup signifies a temporary obstruction in the upper air passage of children leading to difficulty of breathing or in some causes total obstruction of breathing. It may be due to -

- 1 Acute inflammatory laryngitis
- 2 Diphtheria
- 3 Nervous spasmodic laryngitis

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The characteristic feature of the attack is the loud crowing noise which accompanies each indrawn breath and the signs of increasing suffocation. Convulsion is an accompanying symptom.

Neurasthenia

It is a nervous disease and is closely allied to hysteria. The disease is characterised by exhaustion, feebleness and irritability. The symptoms are muscular debility, headache, backache, dyspepsia, loss of appetite and constipation, mental weariness, incapacity and unrest, combined with irritable, capricious and uncontrollable temper. Sometimes the heart is affected and there are palpitation, sweating and vague erratic pains.

Heredity is believed to be responsible for the disease in most cases. Mental and physical strain also brings about neurasthenia. The treatment should be on the lines of hysteria. Care should be taken to improve general health.

Paralysis

When the sensory and motor nerves cease to function then the limbs or organs affected become paralysed. Often only the motor function is lost then the limbs or organs cannot move but there is sensibility. When both sensory and motor nerves are injured there is complete paralysis.

PARALYSIS

When there is injury in the brain then paralysis partial or of the whole body may occur as in apoplexy. Some diseases in the brain may cause paralysis. If the spine is injured paralysis may follow from a mild to a severe type according to the character and extent of injury. The injury may be mechanical due to blow or twisting or a fracture. The injury to the spine may be due to disease. A tumour or overgrowth may press on the spinal cord. Caries may affect and injure the spine. There may be ulceration of the cord. Paralysis may be due to syphilis or otherwise. One form known as tabes dorsalis or locomotor ataxy is almost wholly due to syphilis. Inordinate use of alcohol may cause paralysis.

Children under five are subjected to a special form of paralysis brought on by a special virus. This causes fever and leads on to paralysis. After some days of slight fever which may not be noticed even, it is found that one or other arm or the legs have lost power and the child has become helpless. This paralysis may pass off in a few weeks or may make the child permanently lame. After diphtheria in children, particularly the soft palate becomes paralysed and then the paralysis may travel on to the knee joint and the lower portion or in fact any portion may be paralysed. By time the paralysis often gets cured on improvement of general health helped medicinally as will be explained later on.

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Hysteria 'brings in paralysis which for all intents and purposes is a true paralysis although nothing is wrong with the motor nerves. But by long subjection to this paralysis the limbs get really paralysed and it is no less difficult to cure hysterical paralysis than real paralysis.'

Facial paralysis is another distinct and common type of paralysis. Some of the muscles of the face may be paralysed or it may be a part of general paralysis. It may be due to exposure to cold and there may be no serious disturbance of internal mechanism. After exposure to a draught a person may not be able to move one side of his face. The appearance of the face becomes blank and expressionless and saliva may trickle from the mouth. It may be regarded as a sort of rheumatism and may get cured by fomentation and treatment as for rheumatism.

There may be local paralysis or if mild it may be called a local cramp such as the writers' cramp. In some instances the pen cannot be held, the joints of the thumb or the index finger do not operate in that free and delicate manner which is necessary for writing. Sometimes the wrist becomes powerless or the arm is painful to the elbow. Rest and massage may bring back health if the first warnings are taken seriously. When a paralytic patient is bed-ridden he has to depend for everything on his attendant. Great care and vigilance should be exercised by the attendant in performing his duty. Often it happens

PARALYSIS

that the patient has lost power of speech In that case his needs are to be understood and met without causing extra suffering on the patient Feeding requires care but attending to urine and stools are more serious matters

Paralysis may result in retention of urine or in incontinence of urine To relieve retention a soft rubber catheter should be made aseptic and introduced into the bladder The bladder should be emptied as completely as possible Despite timely emptying, there is a tendency in such cases for the urine to become infected and set up sepsis which may ultimately prove fatal Boric acid in 10 grains doses given thrice daily by mouth prevents sepsis If this does not prevent rotting of the urine in the bladder then the bladder should be emptied and then washed out with a warm solution of boric acid

When incontinence is slight then there is a chance of improving matters by administration by mouth of small doses of datura. This should be given a trial. In more severe cases, an India rubber urinal should be attached to the male organ But in females incontinence is difficult to manage without soiling bed and clothes Aseptic thick pad of cloth or cotton may be put over the genitals and kept in place by light bandage with a water proof covering say of plantain leaf The pads are to be squeezed free of urine and then disinfected by boiling in a disinfecting solution, dried and used over again. The genitals should be frequently sponged with warm antiseptic lotion, wiped dry and

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massaged with oil containing a little antiseptic
Massaging will give tone to the skin.

When faeces cannot be retained owing to the loss of control over the sphincter, it would be necessary to wash out the colon with a large amount of soap and water daily. Fouling the bed would be avoided to some extent thereby. If purgatives are given bed pans should alternately be placed with soft padding to prevent injury to the skin. If the bowels are not washed, large hard masses of stool may form requiring mechanical removal.

Bed-sores have to be prevented. Once formed, it is very difficult to heal them and these may lead to sepsis and death. The patient should be put on a soft bed without any creases. Tender spots should be protected by soft padding. Tender skin should be hardened by rubbing with catechu which tans the surface of the skin. When a sore is actually formed, it should be cleansed daily by washing with an antiseptic lotion, say of neem leaves or of boric acid and dressed with boric ointment.

In paralysis in which the tissue change of the spinal cord is not complete, it is characterised by the increased rigidity of muscles, excitability and exaggeration of reflexes. This is called spastic paralysis. While the patient is disabled from moving he may suffer severely from involuntary flexor spasms. These spasms may come at night and prevent sleep. With some patients light mechanical extension of the lower extremities by attachment of weights will check

SPASTIC PARALYSIS : FLACCID PARALYSIS

the spasms In these cases of paralysis the patient will try his utmost to use his paralysed limbs He should endeavour to force impulses through the lines which are imperfectly conveying them. These efforts of the patient should be aided by gentle massage Electric therapy is of use here.

Flaccid paralysis is characterised by toneless, flabby condition of muscles, which show a diminished response to electrical or other stimuli Here all forms of reflex excitability are lost Flaccid paralysis is accompanied by complete anaesthesia and complete incontinence due to toneless relaxation of the sphincters

In locomotor ataxia where the legs cannot make normal stepping motion, the patient should be reeducated to perform movements An atactic patient should be allowed to take to bed and rest He must strive to make the legs function coherently

In infantile paralysis after the acute stage is over the paralysed limbs should be coaxed to function. By exercise a half paralysed muscle may be brought up to a point where it will do an amount of work nearly equal to the normal Some simple mechanical contrivances should be adapted to the case of each child by which he may regularly and voluntarily direct the muscles

Massage and Sun bath —Barring cases of limbs affected by spastic paralysis where a touch may set up spasm, nothing will be more useful and more important than regular, thorough and systematic

DISEASES OF THE NERVOUS SYSTEM

massage of the muscles. This stimulates circulation and provides nutrition to the parts affected. This may be usefully combined with friction with some warm bland oil. The muscles should be rubbed and kneaded and gently pinched. The rubbing movement should be upward so that blood may flow through the veins. Massage should be helped by exposing the parts to the life-giving rays of sun. Sun's rays act mysteriously in healing diseases. Paralytics should have sun's rays playing on the affected limbs while undergoing massage.

Electricity applied to the muscles will secure their contraction and hence will exercise them when voluntary exercise is impossible. Here some distinction should be made between the kinds of electricity. Where a coil or wire rotated before the ends of a horseshoe-shaped magnet, faradic electricity is generated. The other form is where chemical cell is used such as a bichromate battery to generate current and a contact breaker is used to generate the shock-giving induced current. This last we call galvanic current. To the muscles which respond to faradic current, it should be applied for about 10 minutes daily. Those muscles which are slightly paralysed respond to faradic current. These muscles recover generally spontaneously in time and the faradic current helps the process. Muscles which are very deeply affected do not respond to faradic current. There interrupted galvanic current is necessary. In applying this current the positive pole should be placed on the

TREATMENT OF PARALYSIS ELECTRICITY

affected muscle and the negative on the back. A pole or terminal is marked positive by a X mark in the battery. The interruptions can be regulated by a mechanism within the battery. The more the interruptions, the intenser the action. The electric applications are painful. The treatment should be begun with exceedingly weak current and the intensity should be gradually increased. When there is little response on the muscles, then the poles may be placed very near each other so that there may be greater force of current. Moistening of the poles gives better contact of metal to the skin. Where necessary poles lined with sponge and moistened with water should be used. These applications are to be made daily and continued for two or three years or for longer period if the muscles are receiving nutrition. But if after use for two years no improvement is seen then they may be given up.

Medical treatment in paralysis should follow the symptoms. Those cases, and they are many, which are due to syphilis, should be treated for syphilis with arsenic, bismuth and mercury as described under syphilis. When sensibility is not wholly lost and there is still capability of some motion, treatment should be directed towards arresting the progress of the disease. For alleviating pain salicylates may be used or other simple analgesics.

Where the root cause is known, medicines may be used to help removal of that cause. When there is local numbness or difficulty of movement of joints,

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use of potass iodide in large doses is recommended. In non-syphilitic as well as syphilitic cases, potass iodide in the early stage has a definite place in the treatment of paralysis. *Nux vomica* gives tone to the muscles and should be used for long periods in combination with arsenic. Many bad cases of facial paralysis and post diphtheritic paralysis progress well under strychnine and arsenic treatment.

In cases of local acute pain morphia or opium may be given temporarily for obtaining relief. But it must be occasional troublesome symptom which will justify the use of opium. If it is used for such troubles and pain as are everyday occurring, then opium should not be touched.

When paralysis is due to a pressure on the spinal cord attempt should be made to relieve the pressure. Here surgical aid may be necessary. In cases of the spinal cord and subsequent numbness of the limbs, complete rest should be given to the back bone by keeping the patient in bed. Sun and massage allowed to act beneficially on the affected region.

Chorea

It is a disease of early life and is regarded as a functional exhaustion of the nervous system. In chorea the patient suffers from irregular, involuntary movements of groups of muscles of the arms, legs, face and tongue and of the trunk also. The arms and hands move about in purposeless fashion, the legs

CHOREA

keep moving, the muscles of the face make irregular contractions giving rise to grimaces. The tongue is pushed out suddenly and withdrawn. The eyes roll about and so also the head. Sometimes the whole body may be tossed about in bed. The patient can speak with difficulty and voluntary movements are carried out imperfectly and with difficulty. During sleep the shakings cease.

Naturally or under treatment the disease may disappear but may appear again. Excitable precocious children are prone to this disease. Rest is to be given. Massage, sun bath, tepid water bath, cold water bath and keeping the bowels moved are the general methods of dealing with the disease. It is believed that toxic action in the system affecting the brain brings about the disease. It has also been found somehow allied to rheumatism. Any way, toxæmia may be regarded as the cause and general methods of draining the system of toxins by the way of intestines, kidneys and skin through baths, exercise, massage and douches should find an important place in treatment. In acute case aspirin is very useful. It may be given to children over six years in 5 grains doses twice or thrice daily. Large doses of salicylates are useful, arsenic and nux vomica have a reputation in dealing with chorea. Arsenic 1/60 grain 3 times daily after food may be given. Nux vomica in 2 grains doses three times daily may be given. Aspirin should be stopped or dose reduced as soon as there is a visible effect of it on the system.

DISEASES OF THE NERVOUS SYSTEM

Arsenic and nux vomica may be continued for long periods

Worms may be a predisposing factor. If there are worms they should be expelled

Paralysis Agitans or Shaking Palsy

This disease is due to degeneration of brain tissues. In this disease there is a tremor in various muscles. The hands and ankles shake and the face or lower jaw trembles continuously. The tremor may cease during voluntary movement but comes back with increased vehemence after cessation of work. Aching pains about the head and neck cause distress. Medicine can do very little in this disease. General treatment as described under chorea may be undertaken.

Sunstroke

Nervous disturbance is brought about by prolonged exposure to heat with or without direct exposure to sun. A paroxysm called sunstroke overtakes the patient which may be mild or severe. Liability to sunstroke is increased by fatigue and excitement, by want of ventilation and by the use of alcoholic drinks.

Previous to actual attack, often premonitory symptoms appear. The patient feels dull and listless, there are loss of appetite, nausea and sensation of giddiness. These may last a few hours or persist for

SUNSTROKE

days and end in a fit of paroxysm or disappear by themselves

Exposure to heat or to sun may bring about heat stroke either preceded or not by premonitory symptoms There are giddiness and shivering The face becomes pale, the body is cold and breath comes in gasps Heart and pulse are felt to be weak and the eyes get dilated In more severe forms the face is flushed, body and head become hot, eyes become bloodshot, the pulse becomes strong and quick and breathing is irregular and noisy When the seat of attack is the chest, breathing becomes incomplete Occasionally the person falls down suddenly in an insensible state and does not move

In case of sunstroke the clothing should be removed and cold water sprayed on the head The body may be placed in wet pack The extremities if cold should be rubbed Hot water bottles or mustard plaster should be applied on the feet so that blood may leave the brain The bowels should be relieved by enema When the chest is affected a mustard plaster may be put on it When sense comes back, the patient should be given plenty of water to drink and nursed with care afterwards

CHAPTER—XVI

CONSTITUTIONAL DISEASES

Rheumatic Gout

Rheumatic gout is neither rheumatism nor gout. It is something very different from both but have symptoms common to both of these diseases. The cause, course and treatment of rheumatic gout are however altogether different from either of them.

Acute rheumatism is an infective fever in which several joints are usually attacked. There is considerable swelling and rise of temperature of affected parts which show pain, tenderness and redness. The body temperature rarely rises above 101°F. It is differentiated from rheumatic fever by the absence of profuse sweatings and absence of heart complications. There is no tendency of inflammation to travel from joint to joint.

In chronic form the prominent symptoms are pain in joints which increases at night. There may or may not be much swelling. Application of heat increases pain while at rest it becomes difficult to move the joints. After a time the joints swell and still later stage the swellings shrink and become hard.

Generally rheumatic gout is accompanied by much constitutional derangement, weak health, anaemia etc. Dyspepsia may be present. Large and small joints

RHEUMATIC GOUT

are indifferently attacked. The attack spreads from joint to joint but does not leave the one it had once affected. It causes deformity and distortion of the joints by enlargement and contraction. The limbs, the jaw, the neck joint are all liable to be attacked at an early or late stage of the disease. The joints get more or less fixed and with the advance of the disease the patient becomes crippled and miserably helpless for the remainder of his life. The disease is not hereditary nor is it confined to particular families. It is rather more common in women than in men while in gout women enjoy greater immunity. Sometimes little hard knobs about the size of a pea are seen upon fingers. They are not painful but they are caused by rheumatic gout.

In distinguishing the disease from gout the most prominent fact to be observed is that there is no deposition of soda biurates at the joints. While colchicum is a specific in paroxysms of gout, it has no effect on the rheumatic gout. Similarly, salicylates which alleviate the pain of rheumatism have little effect on rheumatic gout.

The cause of this disease is not definitely known. But malnutrition, constitutional break-down and worry have been assigned as causes and the effects of cures by medicines such as nux vomica, arsenic, iron and iodides point to the disease of having something to do with general debility. Exposure to cold, fatigue and night watch of a exhausting nature have been seen to cause the disease. With the advance

CONSTITUTIONAL DISEASES

of the disease the cartilages at the joints get destroyed and small accretions of bones may also form on the heads of joints. The bones at the joint suffer from degeneration and fluids disappear from joints and movements cause the grating of rough surfaces against each other and later on ankylosis develops and lack all movements. Rheumatic gout is sometimes followed by an attack of rheumatism. In cases of irregular attacks of this disease eyes, ears and larynx may be affected. It has a peculiar choice for the temporal joint causing stiffness and ultimate locking of movement, disabling the patient to open his mouth and eat.

Medicinal treatment lies in effecting a general improvement of health. The digestive organs should in the first place be attended to. If the digestion is impaired, papaya, bismuth and soda bicarb should be given. Bowels should be kept freely moved, if necessary with the help of myrobalan or any other convenient laxative. Occasionally saline purgative of magnesium sulphate may be given. There should be efficient urinary secretion and boric acid 10 grains doses may be given, when necessary. As a general antiseptic garlic should be taken daily. This helps to alleviate pain also. For general tone of the body nux vomica, arsenic and cinchona are useful. Iodides and iodine are found to be of great value. Iodine in drop doses should be given by mouth and in certain cases rather high doses are tolerated. It may also be given intravenously and results watched. Nux vomica,

TREATMENT OF RHEUMATIC GOUT

arsenic and cinchona are reported to act very admirably in bringing the system back to health and arresting the growth of rheumatic gout. Massage with mercury and iodine ointments greatly relieves the pain of joints and helps articulation. Treatment along these lines should be continued for a fairly long time.

Treatment of regulation of diet and regime is of great value. Nutritious diet should be given containing the vitamins. Dahı should be given to produce helpful bacteria in the intestines. Exercise of the affected limbs is necessary where any movement is at all possible. In this disease massage is of the greatest service. The whole body should be massaged with bland oil under exposure to life-giving mild rays of the morning sun. Experts in the treatment of this disease are of opinion that even some of the worst cases have recovered under treatment.

Rheumatic gout is a bad disease, its most common predisposing cause being a thoroughly impaired condition of the system. If treatment suited to the temperament of the individual case, is begun in early stage and the structures of the joint are not seriously injured, the prognosis is favourable although the recovery may be slow. But if the enfeeblement of the system is great, then the probability of arresting the disease is remote. It does happen in some cases that even in most hopelessly affected condition extending over several years partial mobility of the impaired articulations is regained by formation of

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newer surfaces of joint. The comparative symptoms' table given by Garrod is useful in making a differential diagnosis of rheumatic gout as distinct from rheumatism and gout.

Differential Diagnosis table from Garrod

Gout	Rheumatism	Rheumatic gout
Strongly hereditary	Less so than gout	Much less so than gout
Much more frequent in males	More frequent in females	More frequent in females
Seldom occurs before puberty and generally much later	More frequent in young and before middle age	Occurs both in young and old
Induced by high living, wine and malt liquors	Occurs in weak and not caused by wine etc excited by cold and damp	Often induced by depressing causes and sometimes excited by cold, not induced by wine etc.
Smaller joints particularly affected in early attacks and especially the great toe	Large joints are more affected than small, usually several in number	Large and small joints are equally affected
Great pain, oedema and desquamation of cuticle	Pain less intense, seldom oedema	Less pain, much swelling and often some oedema
Does not induce acute inflammation of the structure of the heart	Often causes acute pericarditis and endocarditis	No tendency to cause inflammation of the heart

DIFFERENTIAL DIAGNOSIS TABLE FROM GARROD

Gout	Rheumatism	Rheumatic gout
Febrile disturbance moderate	Febrile disturbance great, more than can be accounted for by local inflammation	Generally but little febrile disturbance
Paroxysms periodic in early attacks	Attacks not periodic	No periodicity, the disease is progressive
Early attack lasting but a week or 10 days	Attacks longer in duration than in gout	Duration of attacks indefinite
Blood rich in uric acid	No uric acid in blood	No uric acid in blood
Constant deposit of urate of soda in inflamed cartilages and ligaments	No deposit of urate of soda, no ulceration of cartilages	No deposit of urate of soda, ulceration of cartilages
Often leads to kidney disease	No tendency to cause kidney disease	No tendency to induce kidney disease
Often induces chalk-stones externally	Never causes chalk-stones	No chalkstones produced but often much swelling of joints

Acute Rheumatism

It is an acute specific disease characterised by fever and pain in the joints and a marked tendency to cardiac damage. It is a disease in which the synovial membranes of the joints are inflamed causing pain and difficulty of movement of those particular joints. But it is not the synovial membrane alone which is affected,

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similar membranes, the object of which are to afford facilities for movement round other structures are also affected. The membranes of the heart, of the lungs and of the intestines are affected, inflaming the endocardium and pericardium, the pleura also the peritoneum

The inflammation of joints causes effusion of fluid into them. The inflammation travels. It subsides in one joint and attacks another. The joints are very painful. In subacute case the pain may not be very great.

The knees are most frequently affected and then the shoulders and ankles and then the wrists, hands and elbows. In its acute stage rheumatism rarely attacks the hips or the toes.

In acute case the temperature rises ranging between 102° and 104° F. In subacute cases the temperature is between 100° and 102° F. The pulse is rapid and bounding usually over 100, the skin gets bathed in perspiration, urine becomes scanty and there is costiveness present. In younger patients endocarditis, pericarditis and pleurisy may develop even without any painful joint. Dilatation of the heart may be regarded as a part of the disease, specially in children. Sometimes the tonsils are affected giving rise to tonsillitis. There is a hereditary proneness to the disease so much so as 25 per cent cases may be traced to heredity. The acute rheumatism is a disease of childhood and youth, the greatest number of cases being between the ages of

ACUTE RHEUMATISM

10 and 20 In acute rheumatism high temperature in young may endanger life. Dangers may arise also due to complications of the heart Otherwise there is no risk of life involved When sweatings cease and the limbs become moveable then a paroxysm of high fever may overtake the patient Even after recovery the liability to recurrence is very great and special care is needed to avoid relapses

The cause of the disease has not been fully ascertained It is a specific infective fever and the course runs like that of other infective fevers

The patient should be given absolute rest Even if the attack is not so acute as to make him unable to move still for safety the patient should be confined to bed on account of possible serious heart complications. Diet should be fluid and preferably of dahi

The nose and mouth should be frequently washed with an antiseptic wash Bacteria possibly enter the system through the nose and mouth Keeping these in a sterile condition by antiseptic gargle and by sucking in boro thymol alkaline lotion through the nose is found to give relief The bowels should be opened with calomel followed by a saline purgative The affected joints should have hot water fomentation and they should be massaged with any ointment containing irritants like turpentine, camphor or menthol After massage the joints should be bandaged with cotton-wool

There is profuse perspiration. The body and bed of the patient should be kept in a sanitary

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condition by frequent changes and by action of the skin being brought out by sponging with tepid water.

Internal medicinal treatment in acute rheumatism reduces itself to taking measures for relieving pain. Sodium salicylate acts as a specific combined with soda bicarb. Salicylates cut short the course of the disease, lessen high temperature, pain and inflammatory reaction of the joints and subside the tendency to recurrences. Soda salicylate may be given in 10 grains doses 4 to 6 times a day and 3 or 4 drams of soda bicarb may be given daily till the urine is alkaline. Rheumatism is a disease of acidosis and the system should be brought to an alkaline condition. Even after the cure is affected, doses of sodium salicylate should continue to be given with soda bicarbonate.

The intestinal condition should be attended to and treated as symptoms arise. The same watch over the lungs and heart is to be kept and necessary steps taken according to symptoms as are described in diseases under those heads. Garlic should be taken daily. This will act as an anodyne and also as an antiseptic. Sometimes salicylates fail, in those cases quinine or cinchona, arsenic and soda bicarb should be given and possibly the disease will come under control. During acute stage small blisters of mustard plaster may be applied to the left upper chest or over the heart and pot. iodide may be given internally in cardiac complications.

TREATMENT OF ACUTE RHEUMATISM

Too much water cannot be given to one suffering from acute rheumatism. The system must be flushed. The flushing is helped by taking large volumes of water, by sweating and subsequent sponging. The water is discharged through the skin as sweat and also urine. Here also there is great necessity of free opening of bowels for flushing the system. In addition to laxatives, if the colon is washed out by a douche the results will be satisfactory.

When the temperature is dangerously high the patient should be given a wet pack and in still worse cases where the temperature rises to 107°F or so, the whole body should be immersed under water. This makes the temperature to fall rapidly. When the temperature comes to 101°F the patient should be made dry and put on bed and covered with blankets. Hot water bottles may be arranged for arresting too much fall of temperature after an immersion.

In very painful joints, datura, opium and aconite may be applied locally. Blistering the joints is also helpful. Tinct iodine may be painted on joints as counter irritant.

Prescriptions

Soda salicylate—2 tablets or 10 grains

Soda bicarbonate—3 tablets or 20 grains

One dose every three hours.

Soda salicylate may be increased to 15 even 20 grains per dose, if small doses will not bring about a relief of pain and other distressing symptoms. Caffeine

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soda salicylate in 2 c c injected intramuscularly on alternate days in acute rheumatism acts as a specific.

Chronic Rheumatism

The word rheumatism is applied very vaguely. Acute rheumatism is an infective fever affecting joints and membranes. Chronic rheumatism cannot always be said to be a sequence of acute rheumatism. On the contrary, a chronic attack is rarely a sequence of acute rheumatism. The two diseases may therefore be regarded as different although with a common name

Chronic rheumatism may be of two kinds, affecting the joints or articular rheumatism or affecting the muscles or muscular rheumatism

Chronic Articular Rheumatism

There are several diseases making the joints painful. There is gout which affects joints, makes them swell, causes deposit of urates and brings in distortion of the joints and eventually cripples the patient. Then there is rheumatic gout in which there is no deposit of urates but the effects of the disease on the joints resemble those of gout. Then there is acute rheumatism in which the joints are affected and of which fever is a significant factor different from the fever of gout or rheumatic gout. Chronic rheumatism is what is left of the cases of joint affections after

CHRONIC ARTICULAR RHEUMATISM

we have excluded gout, rheumatic gout and acute rheumatism

Chronic rheumatism is a disease which from the very onset is of chronic type. The most exciting cause is exposure to cold and wet. It very frequently attacks those who have to work in damp atmosphere and those poor people who cannot obtain sufficient protection from cold. The disease attacks only a few joints. There is one special feature with regard to an attack of chronic rheumatism, it is that the joint is not seriously anatomically injured early. There is a thickening of the synovial membrane and of the tendons, ligaments etc. These changes will entirely disappear with appropriate treatment and perhaps again reappear. There is nothing like the permanent injury seen in gout and rheumatic gout in the early stage of this disease. Chronic rheumatism is characterised by its tendency to attack a few joints only. The joint becomes painful and there is difficulty in movement. It becomes particularly difficult to be moved after rest. But the stiffness and pain are greatly mitigated by active movements of the joint or by massage which works as a passive movement. Although in the early stages there is no serious anatomical change, yet if neglected, it may bring in immovable stiffening of the joint and also distortion.

In this disease local and external treatment with hygienic and regiminal regulation is of greater importance than medicinal treatment. Objects to be kept in view in treating a case are to relieve pain, to

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ensure free movement and to ensure a condition in which the disease will be purged out of the system. For relieving pain, counter irritants and anodynes, massage and movements, hot baths, douches and exposures to hot air currents are useful. As a general measure, garlic should be given daily as an anodyne and antiseptic.

Small moving blisters spread over the joint are greatly useful in early cases. Application of mustard plaster short of producing blister and then continuation of irritation by friction massage is also a good plan. Blister or irritation short of blister may be produced by tincture of iodine locally applied. When after a time the outer layer of the skin comes off, an ointment containing iodine and pot. iodide may be rubbed in. Application of hot saline water in stream over the joint gives great relief. Datura and aconite combined with chillies in a paste act both as irritant and anodyne.

By the combination of irritant, anodyne and massage the swelling of the joint is reduced, ankylosis or locking of the joint is prevented, muscular atrophy is checked and freedom of movement is restored. Massage should be regulated to the condition of swelling and tenderness. At first massage may be only light but gradually there should be given deep kneading movement with continual attempt to the stretching of contractions. The patient should co-operate in the act of stretching. The treatment should be continued for a long period of time.

TREATMENT OF CHRONIC ARTICULAR RHEUMATISM

particularly, if any joint had been stiffened or contracted Hot baths are helpful The temperature should be regulated so as to make the skin have a comfortable feeling Hot bath although good for rheumatism has a debilitating effect on the system and should be discontinued as soon as it is felt to have served its purpose

As for internal remedies, sodium salicylate gets the preference But in chronic rheumatic cases it has not the same medical effect as in acute rheumatism. Soda salicylate with large addition of sodium bicarbonate is to be taken. Some have found aspirin to be more helpful than salicylate For elimination of toxin potass iodide is a valuable agent and should be given in 5 to 10 grains doses three times a day. Fractional doses of calomel should also be given followed up by a saline purge Iodine should be given internally as also an intravenous injection Nux vomica and arsenic should be used to improve the tone of the body

Bowels should be kept freely moved Copious urine should be allowed to be formed for elimination of toxins and plenty of water should therefore be given to drink

General health should be attended to Diet should be light, nutritious and very assimilable Dahi should form a regular item of diet The action of the skin should be attended to by having proper baths Morning sun rays should be brought to play as far as possible over the uncovered surface of the skin Cold

CONSTITUTIONAL DISEASES

should be avoided but this should not be carried up to the exclusion of ventilation. There should be adequate provision for fresh air to play about on the skin

Prescriptions :

Garlic juice— $\frac{1}{2}$ dram or 5 tablets per dose 3 to 4 doses daily as an antiseptic.

Iodine—1 to 2 minims doses by mouth. Injection of iodine intravenously.

Datura and aconite made into paste to be used as plaster.

Pot. iodide—5 to 10 grains doses or 2 tablets for elimination of toxin.

Sodium salicylate—10 to 20 grains doses with soda bicarb to ensure internal asepsis

Calomel— $\frac{1}{4}$ grain

Soda bicarb—10 grains. One dose 4 such doses followed up by mag sulph $\frac{1}{2}$ to 1 oz.

Chronic Muscular Rheumatism or Myalgia

It occurs in persons having chronic articular rheumatism. But this disease may not be rheumatism at all and may be due to neuralgia of the sensory nerves of the muscles. Exposure to cold, to damp and to fatigue are known to cause this. Persons having rheumatic or gouty tendency have also a tendency to this disease.

The chief symptom is pain in some particular muscles. The character of the pain is that it is

CHRONIC MUSCULAR RHEUMATISM

excited by certain movements and is relieved by firm pressure It may disappear in a few days or it may continue with more or less severity and is liable to recur after once it is gone In one form it is called lumbago and in another form it is known as torticollis or stiff neck

The treatment should follow much the same course as in articular rheumatism Local counter irritant combined with anodynes should be given as indicated under articular rheumatism Iodine is to be painted and ointment of iodine and pot iodide to be rubbed Hot water pouled in a stream and hot saline bath are relieving factors

Clay incorporated with glycerin and containing irritants like menthol, turpentine or thymol may be used as a thick coat This often effectively acts as a soother to pain In very obstinate cases opium may be applied in the form of a paste as an anodyne Opium may be given internally also, but then bowels should be kept moved by use of saline or laxatives

Bowels should be kept moved The affected part should be massaged and generally internal and external treatment should be the same as in chronic articular rheumatism Sterilised steel needles put into the affected muscle about $\frac{1}{2}$ or 1 inch deep and 1 to 3 inches apart and removed after a minute or so, is a good local method of treatment The painful muscles rapidly relax after this application and the pain disappears

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Magnesium sulphate 12½% solution in 2 c. c. injected intramuscularly into the painful region is also a very useful thing.

For improving the general tone of health, the patient should be given convalescent tablets or tablets containing nux vomica, arsenic and quinine. Garlic should be included in daily dietary.

Prescription .

Same as for chronic rheumatism of joints.

Gout

Gout is a disease caused by the deposition of sodium biurates first near about joints and gradually inside them and in cartilages, ligaments, synovial membranes, tendons and many other places.

An individual apparently in good health perhaps even flattering himself that he feels unusually well, retires to bed ; after a few hours' sleep (generally from one to four in the morning), he suddenly awakes with a pain more or less intense in the ball of the great toe frequently accompanied with a slight shivering. The pain in the foot gradually increases and is attended with a sensation of burning and throbbing together with great tension and stiffness, heat of the skin and other febrile symptoms or febrile disturbance usually follow the shivering accompanied with a considerable degree of restlessness. After a few hours these symptoms abate, a gentle perspiration ensues

GOUT

and the patient is enabled to enjoy some sleep. In the morning the toe is observed to be swollen, the skin is of deep red colour, tense and shining and the whole joint is exquisitely tender.

Free living and little exercise bring in gout. The deposit in gout about the joints consists of sodium biurate and this is a product of disintegration of the proteins taken. When more than necessary proteins are taken, the decomposition product, the urates cannot be drained by the kidneys with urine as fast as formed. The result is that blood is surcharged with extra heavy dose of urates which it wants to unload here and there. At the joints of extremities where the flow of blood is sluggish or obstructed the load is deposited causing intense pain and interfering with articulation. But even the deposition of the decomposition product of meats eaten, is influenced by other causes which render the kidneys insufficient for proper filtration of blood and elimination of urates. Alcoholic drink and excessive protein-containing diet make conditions favourable for the deposition of urates.

Gout produces excruciating pain which is characteristic of itself. Then there is swelling and subsequently the skin is inflamed. During the early stages of an attack the inflammation is violent and the skin is distended and shining. The oedema cannot be readily observed on account of the swelling. By subsidence of inflammation pitting can be observed and presence of fluid perceived. Rheumatism is not

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accompanied by œdema even if it may occur rarely then the whole limb is affected and not simply the joint. Gouty inflammation generally differs from other inflammation in that it is not followed by suppuration. In gout the fever is proportional to the inflammation but in rheumatism high fever may exist without any proportionate inflammation. More commonly gout returns after some interval. Several months or years may elapse between two fits. When the patient lives within moderate bounds and there is no great hereditary disposition the disease may confine itself to the ball of the great toe. Then there is a tendency of the disease to travel upwards next to foot ankles, then knees, then the hands, wrists and elbows. This succession is very commonly met with in gout. In rheumatism the fingers of the hand are generally first attacked and there is a more general swelling of the limbs.

When the acute attack of gout becomes more frequent and the disease makes a great inroad into the constitution, it assumes the chronic form. The joints are usually swollen, more and more joints are affected and they get stiffened. Muscular pain, nervousness and cramps, acidity, heartburn, flatulence, loss of appetite, constipation etc. are present and there is a general break down with the advance of the disease. The urine becomes scanty and high-coloured throwing down heavy deposits.

Chronic gout may be confined to one or two joints. Sometimes several joints are attacked and sometimes

TREATMENT OF GOUT

it leaves the joints and attacks other vital organs It produces permanent local mischief to the joints attacked and it may assume wandering or suppressed forms with serious effects Gout affecting any joint for a considerable time does not but do serious and permanent injury to the structure up to partial or complete ankylosis of the joints or formation of chalkstones around the joints or in other parts of the body The concretions or white chalk-like stones deposited about joints are called *tophi* from Hebrew, meaning concretions

Treatment — Main treatment in gout is directed towards the regulation of diet Farinaceous diet with some milk or fruits should be the diet of a subject of gout Proteins should as far as possible be omitted from the dietary Constipation is present in gout There should be regular evacuation of bowels with saline purgative Liquor should be given up and meat, fish and dals which contain much protein should be avoided Only the minimum of protein should be taken Rice or ata will furnish some The remainder may be taken from milk and milk products or legumes, beans or eggs The habits of life should be enquired into and corrected Sedentary habit encourages gout Some time should be daily given to open air pursuits Walking is one of the best forms of exercise The action of the skin is to be encouraged Massage is one of the most important items for curing gout

The first effort is to get rid of the acute pain In this matter colchicum corm is said to be a specific.

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How it works in gout is not definitely known but it is believed that colchicum acts upon the disease. It may be given in 2 to 5 grains doses 3 to 4 times daily.

Where colchicum is not available, potassium iodide and chota chandra may be given. Sodium salicylate with soda bicarbonate is useful in some forms of irregular gout.

As the disease originates in the digestive system it is rational that attempts should be made to correct the condition of the intestines. Garlic may be given to bring the intestinal flora into non-disease producing condition. Dahi is helpful in this direction. Plenty of pure water preferably warm water is valuable in treatment of gouty diathesis.

It must be said that drugs are useless without regulation of diet in attempt to cure gout.

Prescriptions :

Same as under gouty rheumatism

Diabetes

In diabetes the carbohydrate which the patient takes as food is converted into sugar and instead of contributing to the formation of blood fills the blood stream with extra sugar and thereby disturbs its normal function and passes out as sugar through the kidneys. The system is so disturbed in some that even if carbohydrates are not taken, sugar is formed from protein and fats. Formation of sugar from

DIABETES

protein however happens to a limited extent Carbohydrates which would have gone to produce heat and energy escape from the body unconsumed The result is that whatever quantity of starch a man may be taking becomes worse than useless The fault lies in inability of the liver to function properly

Some diabetic patients are well nourished and do not suffer from ravenous hunger or excessive thirst. Others affected with diabetes get emaciated rapidly, lose muscular power and suffer from an insatiable hunger The first form is seen in persons passed middle age and the second form is met with in the young The first group profits very much by restriction to fatty and protein food and by giving up starch There is no sugar in urine then But in the second case even without starchy food sugar is formed from the proteins and fats There is no rigid distinction between the two groups, the first gradually merging into the second group

In diabetic patients the skin is dry, the bowels costive and the gums pale and spongy There is a feeling of thirst and progressive wasting The heart becomes weak and brings in a train of symptoms such as swelling of the feet Persons suffering from diabetes are prone to other severe diseases such as apoplexy, lung affections and carbuncle from which death may result Cataract of the eyes is often found in diabetic patients

The treatment lies in the regulation of diet Starchy foods are to be given up gradually and replaced by

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proteins, fats and vegetables *Channa* containing milk protein and fat is a good concentrated food. Light exercise should be taken and much attention should be given to general measures for improvement of health. The bowels should be kept moved by enema and also use of occasional mild laxatives. The action of the skin should be promoted and the muscles toned by massage, rubbing with oil and bath. Sun bath in the morning as a healthful measure should not be neglected.

Amongst drugs doses of soda bicarb should be taken to keep the system free from acidosis. Opium has been found to be useful. Small doses of $\frac{1}{6}$ grain thrice daily may be started with. Opium is likely to induce constipation. The bowels should be particularly attended to. Myrobalans one to three fruits daily will serve the purpose. Jambolan seeds have been highly extolled in bringing down the quantity of sugar. Powdered seeds to the extent of 30 grains per dose thrice daily should be given.

Rickets

It is a disease due to deficiency of nutrition of children and may occur from early infancy. The child is fretful and irritable and has uncertain appetite. The bowels are disordered and urine becomes abnormal. The child becomes peevish and its head sweats at night accompanied by profuse perspiration. The joints grow tender and in developed cases become

RICKETS GOITRE

swollen The leg bones get soft and bent either way producing bow-legs or knock-knees The bones of the arm also show softness The child stands and walks with difficulty Even when the child is three or four years old rickets may appear and create mischief The stomach often protrudes from the normal line on account of the spine being excessively bent

Malnutrition, want of light and insanitary condition cause rickets For treatment of rickets the child should be given plenty of sunlight to enjoy The child should be taken to sunny site and the body exposed and there massaged thoroughly with oil When sun's rays are too hot then massage is to be continued after screening the sun yet bringing in sufficient light. Massage is to be conducted one or two hours daily

Sufficient fresh milk should be given and calcium lactate 5 grains should be mixed with milk and given thrice daily More calcium lactate should be given to older children Excellent results are obtained by combining calcium lactate and sun bath Juices of fresh fruits and of green vegetables should be added to the diet with advantage

Goitre

Goitre is enlargement of the thyroid gland of a chronic character The disease is usually confined to some localities, where it is endemic A water supply which is not protected from contamination by human excreta and which is usually entirely devoid of iodine salts is responsible for the endemic

CONSTITUTIONAL DISEASES

character of the disease Goitre is commoner in women than in men. Occasionally goitre appears in childhood and disappears with puberty. Goitre may be produced by contaminating water and also by depriving the individual a supply of iodine salts.

The swelling of the thyroid gland which is placed on either side of the trachea may be uniform or greater on one side. By its growth it may be pressing on the windpipe and blood vessels, resulting in difficulty of breathing and difficulty of swallowing.

Experiments have shown that the water from streams and wells which are responsible for the development of goitre is rendered harmless by boiling. The safety therefore lies in boiling the water in districts where the water supply is responsible. Goitre has also been prevented in endemic areas by the use of a little potassium iodide with common salt.

In early stages goitre may be cured by application of tincture iodine. Application should be repeated often. Iodine is locally absorbed thereby. In most cases iodine should be given in drop doses to be taken daily for sometime to supply the deficiency of perverted secretion and to hasten cure. Intravenous injection of iodine 1 c.c. twice a week is very effective. Diet consisting of milk, butter, fruits and leafy vegetables rich in iodine should be supplied to the patient.

When the size of goitre is great and there is distress through dyspncea and difficulty of swallowing, surgical assistance should be obtained.

CHAPTER—XVII

INFECTIOUS DISEASES

Influenza

Influenza is a sort of infective disease having symptoms very much like common cold. But it is different from cold in the matter of its being of a very severely epidemic character and attended with complications which may end fatally. In mild or moderately serious case it begins as an attack of cold in the nose. There is a raw feeling in the nose and throat and heaviness of the head with a general feeling of discomfort. The infection spreads from the nose to the throat, larynx and travels down the trachea to bronchi and lungs. The feeling of uneasiness increases and there is aching of the limbs. In a few hours of this ache febrile symptoms prevail with a rise of temperature 100° or 102° or even 104°F . Pulse becomes rapid and soft, respiration is quickened and the skin becomes hot, dry and flushed. Cough is of an irritative character. The tonsils get swollen. There is occasionally diarrhoea. Some become very restless and delirious and others get depressed. In two or three days the fever subsides and by the end of the 5th day the patient is quite free from fever. The duration may be from 3 to 5 days or in some cases 7 to 10 days.

INFECTIOUS DISEASES

During the influenza epidemic of 1918, the cases began with severe symptoms from the first indication of infection. The infection rapidly spread causing serious bronchitis, pneumonia and broncho-pneumonia. In such cases the pulse rate falls and respiration quickly goes up to as many as 50 per minute. There is troublesome cough and the patient begins to sink rapidly.

Treatment should begin with asepsis throughout the system. $\frac{1}{2}$ grain tablet of thymol put into 2 oz of water with 3 grains borax and 5 grains soda bicarb (boro thymol alkali tablets) should be made into lotion. This should be drawn up by the nose and let out through the mouth. It won't matter if in the attempt a quantity gets swallowed. This is to be repeated every hour. Along with it influenza tablets should be taken every 3 hours. Influenza tablets are cinchona benzoate-thymol tablets having the following compositions —

Cinchona febrifuge—	$1\frac{1}{2}$	grains
Soda benzoate—	2	„
Ammon chloride—	2	„
Thymol—	$\frac{1}{2}$	„

One tablet

Washing the nose with saturated solution of thymol and taking influenza tablets are the very best things that can be done in the commencement of an attack. In a very large majority of cases this treatment alone controls the attack without allowing the disease to

TREATMENT OF INFLUENZA

progress at all In some cases this has to be continued for 3 to 4 days

If there is much pain which is so often found in influenza, sodium salicylate in 5 to 10 grains doses may be given Cinchona acts almost as a specific in influenza stopping the progress of disease relieving pain and finally curing the patient Ammon chloride and sodium benzoate help to bring out expectoration easily, sodium benzoate disinfects also the passages Aspirin-caffeine 1 to 2 tablets may be given for severe headache

Bowels should be moved by calomel or castor oil The patient should take rest in bed The disease is very debilitating and early neglect may lead to serious development If bronchitis and pneumonia should develop they are to be treated on the lines indicated for those diseases Heart complications may arise. Arjun in 30 grains doses should then be given to strengthen the heart and other heart complications be treated according to symptoms

As a general antiseptic two more very useful medicines are in our hands besides thymol indicated above They are garlic and iodine Garlic should be given in full doses or as much as the patient can bear. Intravenous injection of iodine is a good plan in this as in many other infective diseases With the severity of the disease the dose of cinchona is to be increased For those who cannot suck thymol water up the nostrils, inhalation should be arranged for. Thymol rubbed in oil may be used for a paint inside the

INFECTIOUS DISEASES

nostrils. This is also very effective. Garlic juice may be sucked up the nose where thymol or menthol is not available. Inhalation of eucalyptus oil is also a common measure not only of soothing the primary attack but a few drops in the handkerchief inhaled off and on may even prevent an attack when there are patients about. The action of the skin should be excited by massage and warm sponging. Sun bath should be taken every morning. In the early stage the diet should consist of fluids only, later easily digestible foods are given.

The disease has got great capacity for spreading from droplets from the mouth and nose of those who are affected and surcharged with bacilli. The patient should be segregated.

During the great world epidemic certain cities tried to check the spread of the disease. Sanfrancisco Municipal Board passed a law requiring every person to wear a mask before coming out in the street. Persons who violated were promptly arrested. The city got through the epidemic in a short time with a few deaths.

Diphtheria

Diphtheria is caused by infective bacilli which attack the mucous membrane of the nose, fauces and larynx causing exudation which appears as a film. The bacilli continue to multiply unless checked and produce toxins which affect the whole system. There is prostration and degeneration of the muscles

DIPHTHERIA

of the heart. The nerves are also affected. It is attended with fever, the temperature rising to 103°F or higher. But in some cases there may be no fever at all although the attack of diphtheria may be very severe.

The bacilli enter the system by contact with contaminated articles and through the spittings and exudations thrown out of the mouth of the patient. It is very contagious and the contagion may be carried by pet animals such as cats and dogs. An unhealthy condition of the mouth and throat, enlarged tonsils, inflamed gums etc predispose children to infection. The disease is most fatal between the second and sixth year.

The attack becomes generally evident by difficulty in swallowing and redness of the fauces. There is a characteristic exudation forming a white membrane on the tonsils. Soon this false membrane extends from the tonsils to uvula and to the pharynx. The throat becomes swollen. The glands in the neck also become swollen and tender. The membrane may gradually change colour and assume a dirty yellowish grey tint. This membrane adheres first and if removed may leave a bleeding surface which soon becomes covered with fresh membrane. The membrane extends from the pharynx to the larynx and also to the nasal cavities. When it reaches larynx the most serious consequences follow. It may further travel down to the trachea. This means that the formed membrane interferes with free

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breathing. The toxins produced go on reducing vitality. The difficulty of breathing, if not speedily relieved causes death.

In milder cases the membranes get detached and fall off and the patient gradually recovers. The poisons produced by diphtheria bacilli affect the heart and weaken it. But very often the disease induces paralysis of the soft palate within a few weeks of cure. The patient's voice becomes nasal and difficulty is experienced in swallowing. In attempting to drink water a portion comes out through the nostrils.

The disease has to be combated locally. The bacilli have to be killed and patches of membrane dissolved out so that multiplication of the bacilli may cease. The general tone of health of the patient has to be maintained so that serious complications may not arise. Preventive measures have to be taken so that the disease may not spread to others.

The earlier the detection, the better the chance of success. At the early stage it will require bacteriological examinations to be definite about the diagnosis of diphtheria. But if the physical indications are such as to justify a suspicion of diphtheria, treatment for diphtheria should begin. The best and most effective measure in a rural area is to dissolve off the affected membrane by a paint of papaya milk in honey and water.

Papaya milk 15 minims or papaya 3 tablets are to be dissolved in one to two drams of honey and

TREATMENT OF DIPHTHERIA

thinned with a few drops of water and painted over the whitened mucous membrane three or four times a day Before applying papaya the area is to be washed out first with hot lotion of borax and honey

Borax—4 drams

Honey—4 ,,

Hot water—1 Pint

The lotion should be as hot as the patient may conveniently bear Moist heat destroys the bacilli and that way the wash is very useful. Washing may take the form of gargle or more conveniently a strong jet may be thrown out of a syringe or a douche nozzle while the patient's mouth lies at the edge of bed

The application of papaya should be followed up by the application of garlic juice Garlic is to be pounded and the juice pressed through cloth A thick swab saturated with garlic juice is to be introduced and the area thoroughly painted Garlic has antiseptic property and it also soothes the inflammation and pain due to infection Some garlic juice is to be administered internally Half a dram or more every 3 hours should be given Putting the patient under a mosquito curtain and introduction of eucalyptus and carbolic vapour in it for inhalation for sometime is regarded to be beneficial When the nose is affected the same lotion may be utilised Sodium salicylate in 10 grains doses may be given as an internal medicine.

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Complete rest in bed is a great necessity. The heart may fail and to avoid any load on the heart the patient should not be allowed to sit up but lie down. When the heart is felt to be weak, arjun is to be given daily in appropriate doses.

When the disease advances and membrane formation with difficulty of breathing continues then the need is for a surgeon to cut open the trachea and let the patient breathe through a tube (tracheotomy). Now-a-days anti-diphtheritic serum is very largely used to combat diphtheria without depending upon local application as sketched before. Anti-diphtheritic serum should be injected as early as possible and this is the most effective method. In fact, anti-toxins have not been so usefully and effectively used in any other disease.

During convalescence or sometime after post-diphtheritic paralysis may appear which affects the soft palate most generally but may extend to limbs also. General nourishment is to be given. Fluid diet as milk, barley water, glucose, fruit juice etc should be given during the febrile period. Sun and water baths combined with friction massage are very necessary. Bowels are regulated by glycerin enema or mild aperients. For internal use nux vomica is the thing. A compound of nux vomica, arsenic and cinchona may be continued for months. Generally post-diphtheritic paralysis in children is curable under proper care and treatment. For post-diphtheritic paralysis general treatment should be as under paralysis.

LARYNGEAL OF DIPHTHERIA

Every precaution should be taken to isolate the patient till long after convalescence. The sputum and washings should be received in covered vessels kept hot enough to kill bacilli. The water is to be re-boiled and put under earth for final disposal. All soiled pieces of old rags for wiping etc should be treated as above or burnt. Children in the same house should have their mouth and nose washed with thymol solution three times a day. They should not be allowed access to the sick room. The room itself is to be disinfected after the patient vacates it by fumes of burnt sulphur, keeping the doors and windows closed for a day.

Laryngeal diphtheria is known as membranous croup. It occurs in children. There are slight hoarseness and rough cough to which the term croupy has been applied. After 2 or 3 days the child suddenly becomes worse due to obstruction of respiration caused by thickness of the membrane. At first it comes in fits and then becomes continuous. The child becomes restless and gasps for breath. Portions of membrane are at times coughed out. Fever is not high. Examination will show false membranes. Treatment should be as in diphtheria.

Prescriptions .

Papaya milk—15 minims Mix with equal quantity of honey thinned with water. Paint.

Garlic juice—1 ounce Paint. Internally in $\frac{1}{2}$ dram doses thrice daily.

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Nux vomica— $1\frac{1}{2}$ grains

Cinchona— $1\frac{1}{2}$ "

Arsenic— 1/60 "

One dose, three times daily after food, for post-diphtheritic paralysis for adults. For children the dose should be according to age.

Whooping Cough or Pertussis

This infectious disease of childhood is characterised by a peculiar paroxysm of cough often of great intensity. It consists of a series of rapid coughing expiratory efforts followed by a long-drawn loud whooping inspiration. During a single paroxysm there may be several expiration and inspiration. In the end a quantity of thick tenacious mucus is thrown out. Sometimes the patient throws out the contents of the stomach on account of the violence of paroxysm.

Whooping cough generally attacks infants and children, rarely adults or old persons. The number of paroxysms varies according to the virulence of attack from 3 to 4 up to 50 or 60 during day and night. The attack is exhausting and painful, the eyes protrude, there may be subconjunctival haemorrhage, blood may come out of the nose and even the ear drum may be ruptured. The delicate vessels of the lungs are injured by the violence of paroxysm. Bronchitis and broncho-pneumonia appear as complications and the injury to the lungs may be so permanent as to cause habitual shortness of breath for all times. Whooping

TREATMENT OF WHOOPING COUGH

cough with its consequent complications is one of the fatal infective diseases of childhood. One attack however seems to protect from further attacks

It is very contagious, the contagion spreads by contact with soiled clothes of the patient, by direct contact with droplets thrown out while coughing and also through pet animals Whooping cough may follow an ordinary cold or bronchitis It very often follows measles It is not usually attended with fever but fever may be present also

To tackle with this disease the first thing is antiseptic treatment of the air passages so that the microbes may die or become less active Inhalation of antiseptics in vapour form is one of the methods, gargling and washing also are other applicable methods.

The explosive violence of cough has got to be reduced This may be done by changing the character of sputum by making it thin and less tenacious The strength of the child has to be maintained throughout the period of attack so that there may be fewer complications The nerves naturally get high-strung on account of the paroxysms and these have to be soothed

Creosote may be vapourised by allowing a quantity of it to be heated over a small fire on a piece of spoon It vapourises and fills the whole room with its vapour The patient on inhaling this vapour feels relief The cavity of the mouth and nose may be antiseptically washed and drained as described under diphtheria

INFECTIOUS DISEASES

Any excess of creosote vapour interferes with kidneys and if the urine gets discoloured, the vapour treatment should be discontinued. Creosote in one or half minim doses may be given by mouth in tablet form or it may be given in form of an emulsion.

Garlic is of great antiseptic value in cases of whooping cough. The juice of the bulb with honey should be thoroughly painted on the throat, the pharynx and larynx. Several drops should be given daily internally diluted with water. Quinine in a grain dose three times a day for a year old child is good in shortening the duration of the disease.

For smooth expectoration sodium benzoate 2 grains, vasaka 5 grains, potass iodide in $\frac{1}{2}$ grain doses are good. For soothing, potass bromide is useful. But the most powerful sedative is datura. When phlegm is copious datura leaf powder may be given in $\frac{1}{2}$ grain doses till there is a little dryness of throat and flushing of face. The dose has to be reduced then. A few drops of chloroform may be given for inhalation on a piece of blotting paper mixed with turpentine. These doses are for a child of 4 years.

These sedatives soothe nervous excitement and are helpful in conserving the strength of the patient. Treatment should be adapted to the complications as they arise, most common of which is bronchitis. Liquid food consisting mainly of milk and sago need be given. Five to ten drops of papaya milk may be mixed with food so that the milk may be quickly digested. Food should be given after a paroxysm so

ERYSIPelas

that there may be less risk of its being thrown off by vomiting.

The patient should be isolated for a few weeks from other infants in a well ventilated room. Patient's body should be kept clean and action of the skin stimulated by massage and sponging with water. Fresh air should be playing through the sick room. Sun's rays should be allowed to fall on the face and throat.

Erysipelas

Streptococcus erysipelatosus—a micro-organism affecting entrance into the skin through some abrasion or injury causes this disease. When the microbes attack the skin only, it causes erysipelas, when they affect the subcutaneous tissues they cause cellulitis while if they enter the blood stream they cause general septicæmia.

Erysipelas is an acute febrile infective inflammation of the skin. The onset is generally preceded by malaise, depression and rigor and is accompanied by symptoms of toxication such as fever, headache, vomiting, backache and joint pains. The affected area becomes red and swells and then spreads rapidly along the lymphatics. The swelling has a sharply defined margin. It affects the face more often than other parts. It creates a feeling of pain and tension and the skin becomes red, tender, hot and shining. Sometimes the swelling is so great as to make one unrecognisable. The eyes sink under the swellings and the lips become awfully distorted. The area

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first attacked shows signs of subsidence, the skin peels off and the swelling travels to another area. When the face and scalp are involved it lasts about eight or ten days. The temperature may rise to 104° or 105° F. Delirium at night is not unusual. In some rare cases there is no fever with erysipelas. When a swelling travels towards the throat, there may be serious difficulty in breathing and swallowing. It undermines general health and these microbes help other microbes to create mischief under their influence. Complications arise and the patient may get heart troubles, pneumonia, peritonitis, meningitis, all of septic origin.

Treatment.— The microbes have got to be fought and their activities arrested. Intravenous injection of iodine 1c c on alternate days arrests the disease and speeds up recovery. Iodine also may be given internally 1 or 2 minims per dose four times daily in an ounce of water. In order to confine the swelling to existing area iodine should be injected subcutaneously along the margin, a drop or two at a point at every line or inch. This often successfully keeps the swelling within bounds.

Where it is possible, the swelled area should be kept soaked with magnesium sulphate in saturated solution. The place is to be lightly bandaged with a thick layer of sterilised absorbent cotton or cloth. This is to be kept continually soaked. The bandage should be removed once in 24 hours, the place examined and the soaking continued.

TREATMENT OF ERYSIPELAS

Garlic should be given internally in $\frac{1}{2}$ dram doses or more, if tolerated three or four times a day

Bowels should be kept moved with the help of a douche and saline aperient such as magnesium sulphate in 2 drams doses three or four times may be given for the purpose The patient should be given liquid food and should be kept separate from others. The offending microbes have the habit of lingering in the room and bed of sick persons, long after the attack These should therefore be properly disinfected by sun light, fumigation of sulphur or washing with disinfecting solution or simply boiling according to the circumstances

The swelled area should never be exposed to air as it is bad for the disease and also risky in the sense that contagion may spread The patient must take rest and if any complications arise they should be treated according to symptoms

Prescriptions

Iodine—Intramuscular and intravenous injection.
By mouth 1 or 2 minims at a time

Garlic juice— $\frac{1}{2}$ dram. 3 or 4 times daily

Magnesium sulphate—Saturated solution to be applied on the affected area and kept soaked with it

Magnesium sulphate—in 2 drams doses 3 or 4 times daily internally

Myrobalan—2 or 3 fruits at a time to keep the bowels moved.

INFECTIOUS DISEASES

ERUPTIVE FEVERS

Chicken Pox

Chicken pox is a contagious eruptive fever of mild nature. The period of incubation is ordinarily 11 to 21 days. Eruptions are preceded by a slight fever. Simple red pimples show themselves topped with a transparent watery spot. This transparent watery spot distinguishes chicken pox from all other eruptions of a similar nature. There is slight itching at the time of appearance of the pimples or itching may be absent. In about four days vesicles break and the swelling begins to subside. In virulent forms the vesicles suppurate.

The bowels should be kept moved and the skin kept clean. Plenty of water should be taken and tepid baths are useful. The temperature does not rise high. Irritation of the skin may be allayed by warm boric bath and by mild boric dusting powder. The patient should be prevented from scratching the pocks. During drying of the vesicles, scales fall off and there is the greatest risk of contagion then. The patient should be confined in a room, in bed, during the eruptive stage till all scabs have completely separated. After the scabs are shed the patient should be given a bath in tepid water in which neem leaves have been boiled. Warm fluid diet such as barley water, glucose water, fruit juice and plain water should be given during acute stage of the disease and during convalescence an easily assimilable diet and a tonic

SMALL POX

containing quinine and arsenic should be given. The room and bed etc should be disinfected. Fumigation for the room, good sunning for the mattress and boiling of washable fabrics in water will serve the purpose.

Small Pox

Small pox is the severest of all infective eruptive fevers and is very much dreaded. After a period of incubation the disease appears as a fever with an aching body and high temperature. In three days eruptions appear as minute pimples. These pimples grow in size, suppurate, causing extreme pain and also disfiguration. It runs the whole system down, the patient generally gets constipated and on the contrary, foul smelling stools also may give trouble. In mild cases the disease runs its course, the pimples suppurate and then heal, scaling off the skin. Sometimes the marks remain throughout life. The eyes get easily affected and corneal ulcer must be regarded as a serious complication. The ulcer should be washed several times during the day with boric lotion. Protargol 1 to 2% solution, a preparation of colloidal silver, gives relief and protection to the affected eyes. The ulcer is so dangerous that in 48 hours it may destroy the cornea. As soon as any sign of ulceration appears, it should be taken seriously and the eyes cleaned with boric lotion. Cold compress is to be kept applied. The eyes should not be bandaged but kept

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constantly clean with antiseptic wash. Opium is said to be useful. It relieves pain in the eye and appears to modify the ulcerative process. Water in which neem leaves are boiled should be used for all washing, sponging and cleaning purposes.

There is no medicine for pox. Each distressing symptom, as it arises should be attended to. The room should be kept well-ventilated and the patient kept comfortable and cheerful.

Vaccination is the accepted preventive. If rigorously followed, frequent vaccination may prevent occurrence of small pox. But serious and permanent injury may also happen by evil effects of vaccination.

Attempts should be made to prevent attacks of small pox by scrupulous personal and mass cleanliness. When the attack will come in spite of precautions, one has to bear it.

The most painful is the period when the eruptions suppurate. It happens usually between the 8th and 12th day of eruption. It is accompanied by a secondary or suppurative fever. This is at once the most painful and most fatal stage. The mouth becomes involved and the patient finds difficulty to swallow anything. Respiration is impeded. Antiseptic spray should be directed inside the mouth. Fever should be lessened, the patient relieved of pain and his strength should be maintained. Everything should be done to accomplish these objects.

The patient should be kept in a well-ventilated room in which light through red house screens is

TREATMENT OF SMALL POX

allowed to enter A mosquito curtain should be hung over the patient's bed to protect him from house-flies and also to prevent spread of infection Cold and hot compresses should be given to bring relief When eruptions are impeded by the thick skin of palms and soles they become very painful Hot compress gives relief

The bowels are to be kept moved with the help of a douche Mouth should be kept clean by frequent alkaline antiseptic washes The eyes, ears and nose should be kept clean Food should be confined to milk or dahi or whey No solid food should be given Plenty of water should be given Quinine is considered to be one of the best things for allaying fever and for keeping up strength Garlic and iodine have their place in this disease as in other eruptive fevers Tepid boric acid baths may be given Pox patients do not tolerate cold baths well

When the pustules are full of foetid exudation, smear them with an antiseptic dissolved in oil Thymol or garlic in oil is good The same may be applied when crusts have formed

During convalescence extraordinary care should be taken in regulating diet and movements The patient may be considered safe for others after he has taken several warm baths on the falling off of scales

Prophylactic measures are common with the other eruptive infective fevers such as measles. It should

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be remembered that the effluvia from a patient may get mixed with the atmosphere and infect the air at a distance. The contagion has a great vitality and clings tenaciously to articles of clothing, specially of absorbent material. Sulphur fume is a good disinfectant both for rooms and clothing exposed to it

Measles

It is an eruptive infective fever of a highly contagious character. It occurs in children as well as in adults. One attack is no protection against future attacks. It is most prone to recurrence.

The disease becomes evident with a sudden rise of temperature rising up to 104°F. Then it falls and again rises. There is profuse running from the nose and eyes as in coryza. The eyes and face get puffed. There is distressing cough. The lungs are also affected. The rash appears on the fourth day. Very small pin-head-like eruptions in patches appear and after a short time scales off the skin. This comes about on the sixth or seventh day of fever.

The infection from measles is subtle. It begins to spread infection before even its characteristic symptoms have appeared and the disease is diagnosed. The contagion again spreads from even the breath of the patient and of course from the eruptions on the skin.

Inflammation of air passages predisposes one for the attack. It is followed by whooping cough or

TREATMENT OF MEASLES

follows it. The intensity varies with the resisting capacity of the subject. In well-nourished healthy children the disease runs a mild course. It is apt to give rise to serious complications which may prove fatal. Should the eruptions remain subdued, disappearing as soon as they are somewhat evident, then there is greater danger of complications arising. Pneumonia, broncho-pneumonia, whooping cough and tuberculosis may develop out of an attack of measles.

There is no specific cure for measles. By observing the general rules of health in sickness, the attack may be got over without medicine. If complications appear, then treatment has to be directed to the distressing symptoms. Generally warmth is desirable. A warm airy room should be chosen for the patient. The nose and mouth should be washed with boro thymol alkali lotion. The eyes to be bathed several times in lotion of boric acid. Warm drinks and maintenance of warmth of the body favour the development of rash and early coming out of the rash tends to save the child from complications arising. However slight an attack may be, the patient should be carefully attended to and his temperature maintained by warmth and action of the skin stimulated by tepid water sponging limb by limb without exposure to chill. A chill is very dangerous in measles.

A few grains of cinchona and soda bicarb need be given daily as the eruptions fade. Should bronchitis develop, the chest should be protected from exposure. Hot milk and sago should be given as diet.

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Dengue

The fever is caused by a kind of mosquito biting a person after it had become infected by biting a dengue patient. The fever runs a short course which rarely exceeds seven days. The mortality is very low but it spreads rapidly particularly in places where the particular kind of mosquitoes (*Aedes ægypti*) abound. Severe pain in the back and round the joints is its characteristic. It is an eruptive fever and causes rashes to appear on the 4th or 5th day. But there are cases in which rash may not appear at all or may be so slight as to be unobservable. One attack of the disease gives rise to some degree of immunity. In any case each succeeding attack is milder than the previous one. There are areas where dengue prevails in an endemic form, but even there it occasionally flares up as an epidemic.

The onset is usually abrupt. The patient in usual health suddenly feels himself to be ill. The temperature rises and within a few hours it may rise up to 103° or 104°F . There is frontal headache and pain over the eye balls. The face, neck and upper part of the chest and throat are sometimes red. There is intense pain in the back and limbs. Shivering is common at the onset. The pain may be agonising specially in the loins and in the joints. The pain increases and falls with the rise and fall of temperature. Complications may arise in case of very old or very weak persons. Old men suffer severely from pain. The patient becomes depressed after an attack of

DENGUE

dengue Influenza shows a great resemblance to dengue But diagnosis is not difficult There is catarrh in influenza and infection is carried by droplets In dengue there is very little tendency to catarrh

There is no specific treatment for dengue The disease runs self-limited short course There is no need of any drugs either For pain caffeine-aspirin and salicylate may be given but not during the height of fever Quinine or cinchona only aggravates distress High temperature may be brought down by hydrotherapy Bromides are useful in sleeplessness The bowels should be kept moved with a mild laxative like myrobalan or castor oil Water should be given in plenty The skin should be kept clean by sponging and by bath, where possible. The patient may abstain from taking any solid food Light food such as barley water, milk and dahi may be given

Dengue, kala-azar and malaria all show that the mosquitoes and flies should be taken seriously

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MALARIA

Malaria is propagated by anopheline mosquitoes. When a mosquito bites a malarial patient it sucks up a number of malarial parasites, the gametocytes, with the blood. The parasites burrow into the mosquito's tissues, grow rapidly and after a week or two produce a number of spores. These spores enter the salivary glands of the mosquito. These are injected into human body with the bite. The malarial spores thus injected mix with the blood of the bitten person and infect him. The spores on mixing with the human blood attempt to enter the blood corpuscles. Some of the spores succeed in their attempt. The spores, within the red corpuscles rapidly change their shape and become small amoeboid bodies. In course of 36 hours these bodies divide into about a score of segments which then burst through the sacs of red corpuscles. They roam about and enter other red blood cells and go through similar segmentation and developments in about 2 days. Thus increasingly greater number of parasites begin to seize the blood corpuscles and in the course of a fortnight from infection thousands of millions of parasites invade the blood corpuscles. When these parasites break up the red corpuscle cells and get released, there comes a shock which appears in the form of a paroxysm of fever.

Some of the released parasites are changed into sexual forms or gametocytes. These remain quietly

MALARIA

in blood stream without causing fever. Only a few days after the onset of fever sexual parasites begin to appear.

The new gametocytes produced complete the life cycle of the malarial parasites which now are ready to be sucked up by anopheline mosquitoes. The gametocytes must live the greater portion of their lives in the stomachs of mosquitoes. The malarial parasites vary in character and virulence.

They get killed by the effect of quinine on them at certain stages. The spores injected by a mosquito into blood are not affected by quinine. When these spores enter the red corpuscles and then after segmentation break through the sacs of corpuscles and come out to cause fever, then they get killed by quinine. Of the released parasites from red corpuscles which develop into the gametocytes some are of a crescent type causing malignant malaria. These crescents are not acted on by quinine.

On account of the dual life process of the malarial parasites partly in human body and partly inside a mosquito, the following things become necessary for the continued existence of malarial parasites:

- (1) There must be human beings who have live sexual parasites in their blood
- (2) There must be anopheline mosquitoes of suitable type
- (3) The anopheles must bite infected persons and survive several days to develop infection

INFECTIOUS DISEASES

(4) The infected mosquito must bite susceptible persons.

Mosquitoes lay eggs under water. They prefer shallow water, not more than 2 feet deep, while even half an inch layer of water stagnating anywhere as in a pool or broken crockery will be an inviting place for mosquitoes to lay eggs. The edges of large tracts of water overgrown with vegetation are also favourable places, while common drains with running water are equally welcome places for the mosquitoes to lay eggs. Shady jungles, crop fields, fields with water stagnating under, serve as breeding places.

The eggs on maturity produce larvæ. These live under water as thread-like bodies with prominent head and tail. These larvæ must have atmospheric air to breathe. They hang head downwards under water with the tail touching the surface from where they suck air for breathing. After a time these larvæ mature and give birth to mosquitoes. The just-born mosquito released from its casing, sits on water for a time and then flies off.

If water is drained away from an area mosquitoes may not find places for depositing eggs and therefore the places may be mosquito free or malaria free. Again the larvæ must come up to the surface of water to breathe. If a layer of kerosene oil is spread as a fine film on surface of water, the larvæ on coming to breathe, touch the film of oil and get killed. It is an excellent method of exterminating mosquitoes. Residents may find appreciable and ready relief from

PREVENTION OF MALARIA

the bites of mosquitoes by having neighbouring water surfaces sprayed with kerosene. But then kerosene evaporates off, so that again a fresh spraying of kerosene is necessary after a few days to prevent mosquito breeding. Fishes and carps greedily devour mosquito larvae. If larvicultural fishes are cultivated largely then also the mosquito breeding may be somewhat restricted in an area. These are palliatives. The poor cultivators cannot possibly drain away marshes or *bils* nor can they use kerosene. Fishes are caught without restriction and without regard to consequences. So, as a general measure for malarial prevention, these are not very practicable methods in the hands of individuals in rural areas. Letting in of muddy water of river in flood to flush the fields, tanks and drains is a generous and effective method of fighting malaria and helping agriculture, but falls within the range of corporate or Government activity.

In order that a poor villager may protect himself against malaria he may try to keep clean his little holdings free from jungle and drains. He should seek out possible mosquito breeding places and make them mosquito free. He may break all thrown-away pottery so that they may not catch water and serve as breeding places. For individual protection a mosquito net to sleep under is very good. Here again poverty comes in the way of most of the rural people. There is a cheaper way for poor people to ward off mosquito bites. Kerosene oil is a poison to mosquitoes and they won't touch the skin.

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if it is smeared with kerosene oil. This is a very good expedient. In order that kerosene may not dry off quickly a little fixed oil such as mustard oil or til oil may be mixed with it. A coat of such oil may effectively prevent mosquito bites for 3 or 4 hours after which another application is necessary. Oil soils clothes and bedding and is therefore objected to and some also object to the smell. There is not much in smell. In a few hours one may get to tolerate the smell.

The mosquitoes are creatures of darkness. During the day they seek out darkish corners in houses and remain in hiding to come out at night. They may be trapped in boxes having a black interior and an opening for the mosquitoes to enter. After they have entered the boxes a few drops of petrol or a spray of kerosene oil will kill the trapped mosquitoes.

A room may be freed of mosquitoes by fumigation. Sulphur smoke is very killing to the mosquitoes. Tobacco smoke is not tolerated by mosquitoes. Some tobacco in powder may be mixed with other combustible materials and kept smoking. Tobacco powder mixed with charcoal and nitre may be made into a dough like mass and drawn into sticks, coiled and dried. This may be kept burning to keep off mosquitoes just like the mosquito killing fumigating spirals, obtained from the market. Tobacco smoke has been found to be equally efficient.

PREVENTION OF MALARIA

Smoke of any kind destroys mosquitoes and this expedient is being used from time immemorial in our cowsheds. Smoke is made by making some damp straw mixed with cowdung cakes to smoulder.

Evening fumigation by incense burning in dwelling houses is also a good expedient for keeping off mosquitoes. Mosquitoes bite most in the evening so that evening protection is a great thing.

In any case mosquito bite must be prevented in order to prevent malaria. The above are some of the means by which chances of mosquito bite may be minimised. In addition to these, cinchona may be taken in 10 grains doses twice a week in malarious places as a prophylactic measure during malarial season. By so doing as soon as the parasites develop to fever-producing stage they may get killed.

Malaria is a dangerous disease, more fatal than is apparent. The parasites enter the red blood corpuscles, multiply and then burst the sacs of the corpuscles. This means that corpuscles are destroyed. When millions of red corpuscles of blood are so destroyed there must be anaemia. As a matter of fact, malaria and anaemia go together. The vitality of the victims is lessened and little capacity is left for earning by physical labour. Thousands of poor persons get poorer by attack of malaria and then succumb to the disease and poverty.

The most malarious season varies with areas and conditions. In Bengal the five months of July, August, September, October and November are the

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most malarious months. There is more subsoil water and more surface water and therefore greater facilities for mosquito breeding in these months. When places begin to dry, malarial cases begin to diminish. In some hill tracts, rains flush out all sources of water and thereby lessen malaria which only begins to appear with the cessation of rains. Generally speaking, the rainy months are the months of malaria but worst after the rains.

When a healthy person is bitten by a mosquito which has injected malarial spores in the blood he cannot notice any change for about a fortnight. If his blood is examined on the 8th day probably no parasites will be found, for they are very sparsely distributed up to that time. But the parasites increase in rapid progression. After this, paroxysm of the attack of malaria becomes evident. The dissolution of so many red blood corpuscles acts as a shock. For a day or two previous to the actual onset of fever the patient feels unwell, gets a slight headache, muscular pains and uneasiness.

Paroxysm of the classical type of malaria has three stages, the cold, hot and sweating stages. The patient suddenly begins to shiver, his teeth chatter and his face becomes pale. He piles up covering upon covering and requests attendants to keep him pressed down. In half an hour the rigor disappears, the patient feels comfortable and temperature goes on rising. The coverings are thrown off one by one. Soon he feels very hot. There is a burning sensation on

TYPES OF MALARIA

skin. This hot stage lasts for about 6 hours. At the end of this stage the patient begins to perspire. The temperature comes down and the patient feels relieved but exhausted.

Such a paroxysm may come every day, every two days or every three days and the fever is termed accordingly **quotidian**, **tertian** and **quartan**. Tertian is the commonest form. In certain form, every two days there is an attack in which the cold, hot and sweating stages are repeated. This goes on for about two weeks then the attacks grow less severe and the fever ceases altogether for a few days. After that for several months there may be alternate periods of intermittent fever and no fever. All these months the patient goes on becoming weaker and more and more anaemic and the spleen gets on increasing in size. Afterwards the periods of attacks may be still fewer and the patient may naturally recover. On the contrary, the patient may go on sinking, having occasional fever. Complications grow, the patient gets increasingly weak and bed-ridden and his power of resistance gets greatly lowered. In this way he is exposed to attacks of any bacterial or other infection. Pneumonia or dysentery or diarrhoea carries him off. In the state of lowered resistance, enlargement of the spleen and liver, enfeebled digestion and sometimes dropsy and haemorrhage trouble the patient. Temperature remains generally subnormal with only occasional rise. The patient slowly sinks and dies. This most generally happens

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in cases which have not been properly treated in the earlier stages or where the vitality has been lowered on account of some disease or malnutrition. Cases of malaria need not be fatal, if treated properly.

It has been observed that an attack of malaria produces some immunity. The paroxysm occurs when the parasites burst the red corpuscle cells in large number. They are let loose. They produce a toxin which brings in fever. Anti-toxin is also produced and lasting immunity is built up only gradually by successive attacks. There are different types of malarial parasites and attack of one variety does not immunise from attacks of parasites of other variety. In malarious localities almost all the children suffer from malaria. After several years as the children grow some succumb to malaria and the more resisting ones who survive acquire immunity. It has also been observed that new comers to a malarious locality suffer very badly from malaria and after several years of suffering those who live through and survive acquire comparative immunity.

Quinine has been found to be specific against malaria. Quinine is obtained from the bark of cinchona tree. Cinchona plants are being extensively cultivated in India. The bark contains other substances besides quinine. But somehow quinine has got prominence. The other cinchona products are cheaper and are quite efficient.

CINCHONA FEBRIFUGE · QUININE

Some of them produce perhaps more headache than others. But the price difference is so great that for poorer people other cinchona alkaloids than quinine, have decidedly to be recommended. These are sold as cinchona febrifuge. Doses should be same as those of quinine.

The best method of administration of cinchona febrifuge would be in a tablet form containing citric acid along with it by the mouth. The tablets should be such that they get disintegrated and dissolved in contact with water. The dissolved cinchona febrifuge can then be absorbed by the stomach. It should be preferably given $2\frac{1}{2}$ to 3 hours after a meal when gastric contents are acid, digestion has been completed and the stomach is nearly empty as then it passes with gastric contents into the small intestine and is rapidly absorbed into the circulation. Some prefer to give quinine or cinchona 2 to 3 hours before the paroxysm of fever is due. It has been found that cinchona in a precipitated state is better absorbed by the stomach. Therefore it is necessary to follow up a dose of cinchona febrifuge with a full dose of soda bicarbonate. Soda bicarb precipitates the cinchona citrates within the stomach. The action of cinchona lies in destroying the parasites. Cinchona is more effective on the parasites as the disease advances and it is more deadly to the asexual parasites when they are young. It has no action on spores in the form they are administered by the mosquito. Therefore cinchona cannot prevent infection even if it is present in blood.

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when an infected mosquito bites. The spores must enter red blood corpuscles, multiply and burst through the red corpuscle sacs to be fit for being affected by cinchona or quinine. The sexual forms of benign tertian malarial parasites, or the gametocytes get killed by cinchona but the sexual parasites of malignant tertian malaria, the forms known as crescents are not killed by quinine or cinchona. In treating malaria with quinine it should be remembered that moderate doses of quinine or cinchona are quite as effective as the huge doses that are sometimes given. Attempts to eradicate the disease by heroic treatment are not only useless but dangerous.

Cinchona or quinine on entering blood stream remains in it only for a short time. Part of it is excreted with urine and part gets deposited in the liver, spleen and other organs but the greater part is destroyed in the body. Cinchona or quinine begins to appear in urine within half an hour to an hour after administration by mouth. Urine continues to show quinine for eight or nine hours but the amount does not increase with higher doses.

It should be remembered that some parasites escape destruction by quinine even when very large doses are given. Complete extermination of parasites is impracticable in most cases and attempts to secure a radical cure by excessive doses of quinine do more harm than good.

TREATMENT OF MALARIA BY QUININE

Dosage of Quinine

Robust male	10 grains
Robust female	7½ "
Children 8-12	5-6 "
" 4- 8	4-5 "
" 2- 4	2½-4 "
Infants under 2	1½-2 "

In treating malaria suitable dose of quinine should be given twice daily for four days after the temperature has become normal. Then the drug should be discontinued for 10 days, again given twice daily for 5 or 6 days. If there is relapse another course of quinine should be given. It should be remembered that the patient must be kept aware of it that despite the stoppage of fever by quinine, relapses may occur. In severe and malignant cases the dose should be given thrice daily during the first attack till the temperature becomes normal, then only two doses should be given daily.

There is a prejudice against the use of quinine in malaria of pregnant women. Malaria is most certain to cause abortion, if not properly treated. Administration of quinine or cinchona by mouth in small doses is calculated to prevent abortion in malaria. If there is abortion after use of quinine it should be regarded as a case in which quinine was unable to prevent abortion which would surely have come, if quinine was not used. Quinine should be given in pregnancy in half doses but twice as often. Potass

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bromide or opium may be given to control uterine contraction. Threatened abortion in malaria should be a definite indication for the immediate use of smaller doses of quinine. The patient should lie in bed when the drug is being administered.

When a case is known to be of malaria, quinine or cinchona should at once be given without regard to the temperature or condition of the bowels. Quinine is less readily absorbed in constipated individuals. But no time need be lost for giving the patient a purging 2 grains of calomel may be given followed up with a dose of magnesium sulphate for moving the bowels. Myrobalan 3 fruits equivalent to 9 tablets may be given to start with as an alternative. Cinchona or quinine may cause vomiting. If a dose is thrown out a second dose should be repeated with a drop of tincture iodine.

It has been observed that cinchona acts more efficiently after a few paroxysms of fever but one need not wait for that. When quinine by mouth fails to arrest fever quickly and the patient suffers from bilious vomiting of malignant tertian malaria and relapses, intramuscular injection of quinine or cinchona in citric acid solution, after proper aseptic precautions and after thoroughly sterilised the skin with tinct iodine, has been found to be of great benefit. Besides less quantity of total quinine or cinchona is necessary, if three injections at 10 grains doses are given on three alternate days. Gluteal region avoiding the line of sciatic nerve is the best situation for this

MALIGNANT TERTIAN MALARIA

There is real risk in intravenous injection of quinine. It should not be ordinarily given. In persons who are very sensitive to quinine and in whom dyspnœa, collapse or haemorrhage may occur, quinine should be given in small doses and total quantity thereby spread out 10 grains of soda bicarb should be given in between each dose of quinine or cinchona.

We have described the paroxysms of benign tertian malaria, but there is a graver and more important form of malaria known as malignant tertian malaria.

In this the typical picture of malaria is missed and the onset is insidious in many cases. The temperature may show a step-like rise as in typhoid fever and the fever may be slight even severe in some cases. At first there is intermittent fever which comes daily in paroxysms. The periods are longer than in benign tertian and the attacks may run into each other so that the paroxysm is intermittent.

In this form delirium, vomiting and early jaundice may be regarded as characteristics and one of these may be the only feature which arouses suspicion that it is a case of malaria. It often happens that the patient may have slight symptoms for a few days and then become suddenly delirious or comatose.

Every case of suspected malignant malaria is to be regarded as an emergent case. The severer forms such as black water fever or cerebral malaria are common in malignant malaria. In malignant form the

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first attack may be fatal within a few days and requires prompt treatment with large doses of quinine or cinchona. But at the same time it must be remembered that malignant form does not respond readily to treatment with cinchona. Certain strains of malarial parasites give rise to very severe attacks which need large doses of quinine, if life is to be saved.

In highly malarious places there are often cases of mixed infection. The benign tertian, the malignant tertian and the quartan type may form any combination and complicate appearances. Cinchona should be intelligently directed against these mixed attacks.

Enlargement of Spleen in Malaria — In the earlier stages of disease there is only slight enlargement of the spleen. When fever is prolonged, great enlargement of the spleen is observed and is very suggestive of malaria although enlarged spleen is also typical of the attack of kala-azar and some other fevers.

Liver in Malaria :— The liver is also enlarged but not to a very large extent. But tenderness in the region of the liver is very pronounced.

The commonest after-effects of malaria are debility and anaemia. These lower the resistance and any other infective diseases like dysentery or pneumonia get possession of the system and cause death. After long suffering from malaria the vitality is so reduced that the temperature often remains subnormal,

AFTER-EFFECTS OF MALARIA CINCHONISM

digestion is enfeebled, the tint of the skin becomes dull and there is a tendency to haemorrhage. Sometimes there is dropsy in the last stages. The mortality is high, the causes of death being syncope and intercurrent pneumonia or dysentery. These conditions are seen in persons who have not been treated properly or who have suffered from malnutrition. In chronic case of dysentery in the last stages with dropsy and lowered vitality, the physician should enquire about previous history of malaria, so that a proper diagnosis may be made.

Theoretically, malaria should never be fatal but when untreated the mortality may be very heavy according to the virulence of parasites. Cases occurring in heavily infected places or cases in which such symptoms as delirium, unconsciousness, drowsiness or very high temperature occur or there are symptoms of shock or where haemorrhage appears, should be regarded as of grave prognosis.

The temperature may run up very high in a paroxysm of malaria. In such a case everything should be done to bring down the temperature physically. All coverings should be taken off, sponging, cold bath or immersion under water are all advisable according to the height to which temperature rises.

Cinchonism. — There are nausea, severe headache, giddiness, disturbed vision, ringing in the ears and temporary partial deafness on administration of cinchona or quinine. These symptoms show that

INFECTIOUS DISEASES

quinine or cinchona has been taken into the blood stream and is doing its work. If the symptoms are very severe then the dose of cinchona should be reduced. Pot bromide in 10 to 15 grains doses should be given with sufficient alkaline drink.

The natural methods of cure should be employed to aid the work of cinchona in combating malaria. The bowels should be kept regularly moved, the action of the skin should be kept stimulated by massage with oil all over the body and subsequent cleaning of the skin by warm sponging or cold bath according to the state of strength of the patient. Sun bath in mornings will help to keep the patient cheerful and will act by securing greater resistance for the patient. The teeth and mouth should be attended to so that foci of infection from other agencies may not establish themselves during the feverish period.

During convalescence from malaria, cinchona, iron, strychnine and arsenic should be given

Prescriptions :

Cinchona febrifuge—10 grains

Citric acid— 5 ,,

One dose twice or thrice daily.

Soda bicarb—10 grains to follow every dose of cinchona

Myrobalan—1 to 3 fruits or 3 to 9 tablets

Calomel—2 grains followed up by mag sulph half to one ounce for free purgation.

ALGID MALARIA MALARIAL DYSENTERY

Cinchona— $1\frac{1}{2}$ grains

Nux vomica— $1\frac{1}{2}$ "

Arsenic— $1/20$ "

Ferrous sulphate—2 "

One dose Three such doses daily after food
during convalescence

Algid Malaria

Algid malaria is also known as algid pernicious malaria. The symptoms are those of cholera combined with malaria. Clinically, it very closely resembles cholera. The patient passing watery stools at the same time the rectal temperature is high. Treatment would follow the line of cholera with calomel and saline and in addition intramuscular injection of 10 grains of cinchona or quinine, repeated once every day. The patient generally is found in a state of collapse with thready pulse, cold skin and shallow breathing. The history of malaria should be elicited and then combined malaria and cholera treatment should be begun.

Malarial Dysentery

Malaria may co-exist with dysentery when a malarial patient gets stools with mucus sometimes mixed with blood. The recognition of only one disease would be an incomplete diagnosis and treatment will be unsatisfactory. History of malaria or symptoms

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of malaria should be carefully sought for and treatment both as for malaria and dysentery should be undertaken

Black Water Fever

Black water fever is a pernicious form of malarial fever. It may appear in a mild form or in a severe form or in a fatal form. The paroxysm resembles the paroxysm of malignant tertian malaria. It comes on with rigor and lasts for one or two days and haemoglobinurea which is the chief characteristic of the fever persists for the days of fever only. In a severe form the onset is with rigor. The fever lasts for three or four days and haemoglobinurea is pronounced. The fatal type shows great severity from the time of onset. There are high fever, scanty, red or black urine and collapse. Death may be due to heart failure or anaemia or from suppression of urine.

During severe attack there is mild jaundice, vomiting and pain or feeling of discomfort in epigastric region. Anaemia develops very rapidly during the disease and may be intense. The recuperation of blood cells is also very rapid during convalescence. The urine is brown or even black due to the presence of oxyhaemoglobin. Pulse is weak, rapid and of low tension. The patient is prostrated but seldom loses consciousness, on the contrary his mental condition is usually quite clear.

BLACK WATER FEVER

The disease is associated with and is an after-effect of malaria. But malaria alone is rarely capable of causing the disease. Two factors are of importance for an attack of black water fever. There should be more than one infection of malaria. The second important factor is that the person must have taken quinine in an irregular manner. There is a good deal of evidence to show that quinine and repeated attacks of malaria act in a mysterious manner to cause an attack of black water fever.

In regions where malarial infection is limited to a brief season in each year, the disease is uncommon. The disease again is uncommon amongst those who never take quinine. Repeated attacks of malaria and indifferent treatment with quinine are supposed to excite the disease. In majority of cases a dose of quinine has been taken just before onset. This dose of quinine is the usual precipitating factor, although quinine certainly cannot be the cause. Any way when the field for black water fever is ready by repeated attacks of malignant malaria and when there has been an insufficient use of quinine, a dose of quinine mysteriously acts on the system and begins to break up the red corpuscles. The malarial parasites disappear from blood during an attack, reappearing if there is a relapse.

When the disease is detected there is no malarial parasites in the blood. For this reason and also for the reason that quinine excites the disease, during an attack of black water fever quinine should not be

INFECTIOUS DISEASES

given Quinine or cinchona will bring death nearer. The patient should be kept in bed and given plenty of alkaline water to drink. Thirty grains of soda bicarbonate to a pint of water will be a good drink. Small quantities of this should be given very frequently so that during the day 4 pints of water may be taken in. If there is vomiting and water given for drinking cannot be retained, continuous rectal saline should be given. A large soap and water enema may be given as a preliminary. Colomel may be given in fractional doses to the total extent of 3 grains per 24 hours, but purgation should be avoided.

Subcutaneous normal saline is recommended to be given in quantity of a pint twice daily. Enema of the same strength may be given. No drug is known to have any specific action on the disease. Glucose solution may be given with rectal saline to maintain strength. Intravenous injections of 1 to 2 pints of normal saline with 5% glucose assist the heart's action and help to combat toxæmia and suppression of urine. Hot fomentations over the loins or dry cupping and intramuscular injection of caffeine soda benzoate 2 c.c. are the methods to combat suppression of urine. When the patient is recovering liquid food should be given. During convalescence arsenic and iron are good for rapid recoulement. For prevention of black water fever the same measures are to be taken as for malaria. It is remarkable that where malaria prophylaxis has been carried out effectively, black water fever has invariably been controlled. Regular

KALA-AZAR

mass treatment of malaria with quinine has caused great diminution of black water fever in those areas The attacks of black water fever are most frequent during malarial season and immediately after

Prescription

Soda bicarb—10 grains 1 dose

Calomel— $\frac{1}{2}$ grain

Soda bicarb— 5 grains Repeated doses

Avoid quinine or cinchona

Kala-Azar

Kala-azar may be mistaken for typhoid in its early stages and for malaria in its later stages When the disease is fully developed there is great emaciation while the abdomen protrudes out on account of the enlargement of the liver and spleen The superficial abdominal veins become prominent The face is discoloured and assumes a dusky appearance The disease goes by families If there is one patient, others also get the disease Children are most affected by it In kala-azar the fever persists but in developed cases the patient has little distressing symptoms and is often unaware that he has fever although he may have a temperature of 102°F There is more or less anaemia but not so pronounced as in malaria In some cases there is oedema of the feet and sometimes dropsy The fever is not controlled by quinine which has no action on it The patient rarely dies

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directly as a consequence of kala-azar but invariably complications arise such as sepsis, broncho-pneumonia, diarrhoea, dysentery and very often cancrum oris which end the struggle. The disease is a lingering one and the mortality is very high. Till antimony treatment was discovered for it, the mortality was 88 per cent or over. Because of its lingering character and high mortality it is one of the most terrible of human maladies.

The great enlargement of the spleen is a prominent feature. The liver is also enlarged after three to six months of fever. The fever of kala-azar is very characteristic. It shows two or even three distinct rises and falls in every 24 hours. The temperature does not vary much and it does not often rise 2 or 3 degrees above normal. In the early stages, high continued fever may be often seen. At that period it may easily be mistaken for typhoid. But soon the temperature will reveal the double rise helping diagnosis of its being a case of kala-azar. In other cases the fever comes on steadily with increase of the spleen. Although the patient may be suffering from a rise of temperature for 6 months or more he may be quite unconscious of it. When the patient is run down and there is sepsis, then there may be high continued fever. Here kala-azar may be mistaken for malaria. But the characteristic double rise of temperature and the futility of administration of quinine at the rate of 30 grains daily for a week will exclude malaria.

KALA-AZAR

Septic infections are by far the most frequent complications. There is **cancrum oris**. This may cause extensive sloughing away of the cheek. Sometimes these lead to increase of white corpuscles and this reacts and may even go towards bringing about a recovery of the case.

Dysentery is a common complication ending in death of the patient. There is a tendency to haemorrhage in last stages of the disease. Sometimes all over the body specks of clotted blood are seen from under the skin. It is remarkable that the patient retains his appetite although towards the end the digestive system may be disturbed and diarrhoea and dysentery occur.

A simple laboratory method of testing blood for kala-azar is to apply the aldehyde test. About 2 cc of blood is drawn from a vein of the patient with help of a hypodermic syringe. The blood is put into a test tube and allowed to clot and the serum separated. To the serum 2 drops of formalin or 40% formaldehyde are put. If this is followed by development of a white gelatinous mass in half an hour it gives a positive proof of the presence of kala-azar.

About the year 1915, it was found that if solution of sodium antimonyl tartrate is injected into blood, kala-azar cases get cured. Later on other preparations of antimony such as urea stibamine, stibosan, neostibosan, stiburamin etc have been found to give much quicker and better results.

INFECTIOUS DISEASES

Sodium antimonyl tartrate is better than potassium salt although both are toxic and irritant substances. A sterile two per cent solution is made. 1 grain of salt in 3 c.c. of normal saline makes two per cent solution. The solution should be made sterile by boiling for half an hour in a closed tube. On the first day an adult may be given half a grain or one and a half c.c. The dose may be increased by $\frac{1}{2}$ c.c. every week up to a maximum of 2 to $2\frac{1}{2}$ grains or 6 to $7\frac{1}{2}$ c.c. per injection.

The injection into the vein should be carefully done. If any liquid will escape into the tissues around the vein then intense pain and inflammatory swelling will follow. The vein may eventually be blocked up. The injections may be given every 2 or 3 days.

For children doses should be proportionate. The first injection may be $\frac{1}{2}$ c.c. of 1 per cent solution for a child weighing 15 to 20 seers. All do not tolerate the injections to the same extent. Toxic symptoms may appear immediately after the injection. There may be coughing and nausea. Dose should not be increased on the appearance of these symptoms. If there is sickness the dose should be reduced and only increased after the distressing symptoms have disappeared. The injections work up reaction and fever may follow an injection. But unless the fever is excessive no importance may be attached to it. Under this treatment the temperature will go on falling except on the days of injection. A rise of temperature on an injection will indicate that the cure is not yet complete.

TREATMENT OF KALA-AZAR WITH ANTIMONY

and that more injections are necessary. The maximum curative dose is said to be 25 to 4 grams for every 100 lbs weight of body.

Urea stibamine is of value in doses of 05 gram increased by 05 gram at each injection up to a maximum of 025 gram with a total quantity of 26 grams in 12 doses in course of 32 days in adults. Urea stibamine is a brown amorphous powder soluble in distilled water forming a clear yellow solution. About 3 c.c. of distilled water may be required for 02 gram of the drug. It is especially useful in those cases resistant to antimony tartrates. There are other preparations with similar names and properties.

If cases are treated insufficiently, fever may relapse. There are also some very severe cases which resist the action of antimony even in its newer and most active forms. These cases end fatally.

In young children where the veins may be too small to permit of intravenous injection, intramuscular injection of 5 per cent metallic antimony in lanoline has been found to be effective in bringing about cure. Colloidal antimony intravenously is more powerful than the tartrates. Neostibosan and neostiburea may be given intramuscularly.

It has only recently been discovered that kala-azar is caused by a little fly called sand fly. The disease is infectious and from one infected person the sand flies by their bite carry it to others. Thus it happens that members of one family fall a victim to it. In 1897

INFECTIOUS DISEASES

Rogers found out that kala-azar could be controlled by removing the uninfected persons to a new place in new houses. The new place may be only a few hundred yards away. If any cases were found to have developed kala-azar due to previous infection they are removed from the new place. In 1914 it was reported that by this process kala-azar was stamped out from 10 badly affected areas with a total population of 6727 during a period of 18 years. But then in those days every case of kala-azar was a fatal case. It was a question of prevention of new attacks. Those who had the fever were left to die in old surroundings. Fortunately now, in antimony treatment, we have found a remedy by which we may easily stamp out kala-azar from an area by course of systematic injections of all affected persons.

Plague

Plague is a highly infectious and excessively fatal disease caused by the bite of infected fleas from plague infected rats. Plague is due to the bacillus pestis. When rats get plague their blood is sucked by a kind of fleas which live on the rats. When the infected rat dies, the fleas leave the cold body and bite human beings in the absence of a better victim. At the time of bite infection from the mouth of flea is communicated to the person through the wound. In three days the plague symptoms appear. Sometimes the incubation period is from 2 to 8 days. Once a man

PLAQUE

is infected the same fleas carry the plague bacilli from man to man. Droplet infection in pneumonic plague cases spreads the disease. Although the infection is the same, plague may appear in three different forms in human beings. When the lymphatic glands swell it is called bubonic plague. This is the commonest form. When on account of lowered resistance glands do not arrest the bacilli but they spread on to general circulation, septicæmia is caused and the form is known as septicæmic plague. The lungs and bronchi again may be affected and the patient may have pneumonia. The plague is then called pneumonic plague. Pneumonic plague does not occur when the atmospheric temperature is above 16°C or 60°F. Bubonic plague virulence decreases with rise of atmospheric temperature and also it is less, the less humid the atmosphere. Plague generally appears in dirty and insanitary quarters, ware-houses and grain stores etc and attacks mostly poor people under unhygienic conditions during its first out-break.

The general symptoms common to the plague of all three kinds are appearance of pain, general feeling of illness and mental apathy. Then there is sudden chillness and the temperature rises to 103°F. The pulse becomes rapid and respiration hurried. There is severe frontal headache and pain in back and the conjunctivæ are congested. Restlessness, unsteady and slow speech, great delirium, mental dullness and prostration are other features. The patient in a day or two becomes very ill. The temperature fluctuates

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between 102° and 106°F and there may be a deceptive remission just before death.

When the flea-bite causes local inflammation or when the bacilli travel up to the glands they cause inflammation of the glands and there is tenderness and oedema of the neighbouring tissues. In very mild attacks of bubonic plague, if the patient survives till bubo suppurates, then there may be recovery. Early operation of suppurating buboes helps recovery.

Plague cases are mostly fatal and there is little to be done by way of medicinal treatment. Treatment is symptomatic. The patient should be made comfortable, his temperature lowered by sponging or wet pack. The action of the skin should be stimulated and the patient should be given sun baths where possible. For relieving intensity of pain morphia may be given. Pot bromide may be given to induce sleep. Arjun should be given in full doses to strengthen the heart. Fractional doses of calomel should be given to relieve gastro-intestinal trouble. All possible sanitary precautions should be taken to prevent spread of the disease. The safety lies in prevention.

Plague originates with rats and is spread through the agency of rat-fleas. By a break in this chain plague may be prevented. The best method, as was adopted from the earliest times, is to vacate the locality. Thus men are got freed from contact with infected rats. Guinea-pigs are very susceptible to plague. Before returning to a vacated quarter

PLAUE

guinea-pigs in cages should be kept in the houses and if they are found to die the return to house should be deferred till guinea-pigs indicate freedom from infection. In Bombay a village was evacuated on the detection of a single case of human plague. Tests were continued in the houses and after a time it was seen that plague affected 40 per cent of the houses and plague bacilli did not die out within two months. Places subjected to natural inundation such as some areas of East Bengal are naturally free from plague as rats cannot harbour there all throughout the year. Places where there are granaries are more subjected to dangers of plague on account of the existence of large number of rats.

Rat traps are helpful in reducing the number of rats. The traps must be boiled in water in order to free them from odour so that they may continue to be used effectively. The spring traps are many times more efficient than the cage traps. The affected houses should be thoroughly fumigated with sulphur smoke.

Diagnosis of plague may be of use in place where the disease has become prevalent. High fever with septic symptoms in a locality where rats are dying will point to the proper diagnosis. Valuable research work is being conducted for a long time in Bombay research laboratories and many useful data have been established. It has been found that curve of death rate of rats was closely followed by death rate of human beings from plague after about a fortnight.

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Iodine injection has been tried but not successfully. In the absence however of any other commendable form of treatment, iodine should be injected intravenously. The bubo should be operated upon and the wound dressed with iodine solution. Garlic has high internal antiseptic value and should be tried. The patient should be kept practically without food, only plenty of water should be given.

Attendants must protect themselves from infection by frequent smear of kerosene oil which prevents fleas from biting. In pneumonic plague the attendants should wear cloth masks or several layers of gauze and cotton wool over the face and neck to protect themselves from droplet infection.

Gonorrhœa

Gonorrhœa is a venereal disease due to gonococcus which enters the system through sexual contact. Accidental contact of exudate of a gonorrhœal patient may occasionally also cause the disease. Women suffering from gonorrhœa may communicate the disease to children during child birth. It is a very serious disease and causes great suffering.

It appears in five to six days after exposure. The private parts get swollen and inflamed. At first watery discharges begin to flow which become thick muco-purulent and yellowish in a few days. Intense burning sensation or pain is felt at the time of passing urine. The groins, thighs and testicles ache and

become tender On occasions the penis becomes hard and is very painful The acute stage of gonorrhœa lasts about two or three weeks

Gonorrhœa is a very obstinate and very persistent disease Rarely persons die as a direct result of gonorrhœa. It is responsible for various other diseases. Once the tissues are affected gonorrhœa assumes serious proportions The suffering due to gonorrhœa is intense The infection lasts for years and the organs involved may be free from toxic effect for long periods only to reappear after years

As a result of primary infection, acute and chronic inflammation of the urethra may follow There may be inflammation of the cervix of the uterus There may be ulcer in the urethra and inflammation of the prostate gland or of the fallopian tubes Both sexes may suffer from cystitis Chronic ill health and sterility are frequent consequences of the disease. The whole system may be affected in the form of gonorrhœal rheumatism and arthritis General blood infection in the form of septicaemia, pyæmia and other septic manifestations may bring about serious consequences The heart and lungs may be affected resulting in endocarditis, pericarditis and pleurisy

Urethral injury causes great burning sensation when making water The distress may be allayed by making the urine alkaline by taking large doses of soda bicarbonate The patient should drink plenty of plain water, soda water, whey, bael or isafgul sherbat to flush the urethral canal Oils like santal or copaiba are said

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to have a soothing effect in gonorrhœa. Santal oil in 5 minims doses, should be given after each meal and at bed time. Similarly cubeb is regarded as useful Irrigations of the urethal canal by douche with a very weak solution of copper sulphate or potass permanganate or protargol $\frac{1}{4}\%$ solution should be given once or twice daily with advantage. Disease should be treated according to symptoms. Vaccine-therapy has been recommended but it has not met with much success.

Syphilis

It is an infectious disease in which the specific organism—spirochæta pallida enters the skin or mucous membrane through a scratch or crack and passes into the circulation through the lymphatics. The foetus may get it from the womb. It is most generally conveyed through sexual intercourse although it may be transmitted to a healthy person by a syphilitic patient through contact of syphilitic wound with abrasions on the skin or through common articles of use. But this form of spread of syphilis is rare. The commonest cause is direct transference by sexual intercourse. When a man conveys the disease, it is not necessary that he is suffering at the time from syphilitic wounds on external genitals. The semen often contains the micro-organisms. The chances of infection by this method vary with time. The chances diminish in the second year and after five years it is

SYPHILIS

unusual for infection to pass over in this manner. But an infected mother may pass over the infection to the foetus at any period.

The incubation period varies from 3 to 5 weeks. A small papule then appears at the site of infection and quickly forms into an oval sore or hard chancre. The tissues beyond become indurated which become more and more prominent. In some primary sore it is felt that a button is embedded in the tissues. The sore does not bleed easily but serum oozes out when scraped and it teems with syphilitic organisms. This primary sore is very often painless. Shortly after its appearance the nearest lymph glands become painlessly enlarged, hard or shotty. The glands may attain large size. A syphilitic bubo does not usually suppurate. It may do so as a result of some secondary infection. This is the primary stage.

Usually in about 4 or 6 weeks after the appearance of the primary sore a rash appears. The syphilitic poison by this time has gained entrance into the circulatory system. The eruptions generally start on the sides of the trunk. These are of the size of a split pea and also larger and of pinkish colour turning to brownish tint. The eruption spreads gradually over the trunk and limbs and in a few weeks fades and disappears. This is then followed by papular eruption. Dome-shaped, dull red papules appear distributed over the trunk, limbs and face. These are generally of the size of a lentil. These mature and pass on to pustular form. The underlying

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tissues are eroded or ulcerated. The secretion dries to a crust and gets heaped up by deposit of successive layers forming what is known as a rupia. Eruptions in syphilis are characterised by their coppery colour, by their symmetrical arrangement and by the absence of itching. The hair is shed in varying degree. Both in the primary and secondary stages there may be slight fever, malaise, headache and pain in the limbs. There is some degree of anaemia.

From about the sixth month or even earlier the patient may develop symptoms indicating affection of the central nervous system. Syphilis then passes on to the third stage. The papules run into each other and form nodules which are more deeply embedded and tend more to ulcerate than the papules. Sometimes the affected areas look as if a number of groups of concentric circles have been described on the skin. Or a snake-like line of varying length may be formed on the skin. Skin gummata may form in various places. Gummata of tissues underlying the skin may appear later on. They grow up as India rubber lumps with size varying from that of a small berry to that of an orange. They are painless, quietly expanding growths, breaking through the skin discharge their contents leaving clean cut ulcers with over-hanging edges, tough slough occupying the bases.

The bones are affected in tertiary stage. In long bones there is localised gumma which necroses in the centre, the contents are discharged through the skin which shows an intractable ulcer. Gummatus

TREATMENT OF SYPHILIS BY MERCURY, BISMUTH ETC.

infiltration may affect the bones of the face specially the nose resulting in horrible mutilation. The testes, the mouth, palate, throat and tongue may be the seats of gummatous.

The disease may affect the central nervous system and the spinal cord with very serious results. It may affect the meninges causing meningitis. Syphilis may cause intense headache and may create locomotor ataxia or it may attack digestive organs or liver and upset them. It affects the heart and its blood vessels and is an important cause of arterio-sclerosis. The tertiary stage of syphilis is so serious that health may be undermined in innumerable ways making the sufferer unfit for any work and causing severe distress.

Arsenic in organic compounds, bismuth and mercury salts are poisons to the syphilitic organisms. If these are made to circulate in blood, the organisms get destroyed and the disease may be controlled. The earlier the treatment, the better is the prospect of recovery. The injuries that had already been done to the bones or tissues are mostly of an irreparable nature. Treatment should be commenced as soon as a positive diagnosis is made. It may not be possible to administer arsenic to poor people for the preparations of arsenic such as salvarsan, neosalvarsan, sulfarsenol etc are costly. Mercury remains the sheet anchor in the treatment of syphilis. Bismuth has now been found to be more active than mercury. Mercury may be applied to the sores as an ointment. It has the

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property of killing the organisms as they come in contact Mercury may again be administered in the form of inunction, rubbing in the medicine through the skin. Mercury in this way reaches the circulatory system and goes on killing the organisms in blood and tissues Mercury may be given by the mouth and also intramuscularly. Different preparations are suitable for different purposes.

Ointment :—

Calomel—33

Vaseline—67

Metchnikoff prevented the development of syphilis after inoculation with virulent syphilitic micro-organisms by rubbing a similar ointment into the scarified area an hour after the inoculation. This has been a classical experiment. This ointment may be very usefully applied on all syphilitic sores. This again may be used for inunction. One to two drams of the ointment are rubbed for twenty minutes into the thighs, calves, chest, arms and back. Different places are selected on different days in a cycle The course is from 60 to 200 days, the length of course depending on the state of the gums and general health. In mercury treatment, whenever there are signs of gums being affected or stomatitis appearing, administration of mercury should cease and should be restarted on subsidence of signs of mercury poisoning with a smaller dose. For intramuscular injection mercury biniodide in 1% per cent solution

TREATMENT OF SYPHILIS BY MERCURY, BISMUTH ETC.

in doses of 1 c c should be used daily or on alternate days to a total of twenty or thirty injections

Calomel in $\frac{1}{2}$ to $\frac{3}{4}$ grain rubbed in 20 minims of almond oil may be injected intramuscularly as an insoluble preparation. The needle has to be put into the gluteal region straight down and then the contents of the syringe slowly pushed in

For internal administration mercury may be given in a finely divided state mixed with chalk as hydrarg cum creta. One part of mercury is mixed with 2 parts of chalk and rubbed till no mercury globules are visible even with a magnifying lens. The more the ingredients are rubbed together, the better is the subdivision of mercury and therefore better the product. By keeping, mercury changes chemically and becomes more absorbable, therefore the preparation may be kept stored for some time

Hydrarg cum creta may be given in 1 to 2 grains doses in the form of a pill made up with $\frac{1}{4}$ grain of opium per dose. Opium lessens the irritating effect of mercury in the intestines

With this preparation also the dose is to be gradually increased till signs of stomatitis appear and then reduce the dose. The object being to administer as much mercury as possible without toxic effects. After a course of six weeks a week's rest is to be given, then a second and a similar third course

Bismuth is more quick acting than mercury and efficient in killing the organisms. One of the best

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forms for introducing bismuth into the system is a cream of bismuth salicylate in arachis oil. Bismuth is tolerated better than mercury. A course of bismuth injections goes further towards eradicating the disease than does a corresponding course of mercurial injections. The toxic effect of bismuth is somewhat similar to that of mercury. The first sign is a slaty blue line at the margin of the gums. On further continuation of bismuth, stomatitis may appear. But generally speaking, bismuth gives much less troubles than mercury.

A 2 c.c. ampoule of bismuth salicylate contains 2.5 grains of bismuth salt corresponding nearly to $1\frac{1}{2}$ grains of metal 3 to 4 grains of metal may be given per week, so that 2 injections per week are advisable The course is to last 10 weeks of 20 injections

Iodine promotes the resolution of syphilitic processes and is most useful in later stages. Potass iodide may be given in 5 to 30 grains doses twice daily The tendency is to push the dose for efficiency. But potass iodide may cause gastro-intestinal symptoms. A better way therefore is to inject iodine solution in potass iodide intravenously 1 c.c. per dose containing 0.37 grain of iodine Injection of iodine is to be given in a combined course with bismuth. A routine way of treatment would be to treat all ulcers with mercury ointment and inject bismuth intramuscularly and iodine intravenously twice a week for 10 weeks.

TREATMENT OF SYPHILIS BY MERCURY, BISMUTH ETC.

Should mercurial poisoning develop in treating syphilis with mercury, attention should be given for healing the spots of stomatitis. Potass chlorate in saturated solution should be given as a gargle. Potass chlorate lozenges may be given to suck. The gums should be cleaned twice daily and an antiseptic gargle should be used. Sodium thiosulphate may be given intravenously for arsenical poisoning, mercurial and bismuth stomatitis. As in tuberculosis the patient's power of resistance should be increased by giving good food and proper nursing.

Prescriptions

Salvarsan 606 and other arsenical preparations introduced since 1910 are very much in use

Mercury metal—Incorporated in chalk in doses containing $\frac{1}{3}$ to $\frac{2}{3}$ grain of mercury

Calomel ointment—Containing $\frac{1}{3}$ calomel and $\frac{2}{3}$ soft paraffin to be applied over wounds and as an ununction

Mercury bimodide—1% solution in 1 c.c. dose by intramuscular injection.

Bismuth salicylate—2.5 grains in 2 c.c. arachis oil by intramuscular injection.

Iodine—1 c.c. dose containing 0.37 grain iodine by intravenous route.

Potass iodide—5 to 30 grains doses by mouth twice daily.

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Leprosy

Causes :— The cause of leprosy yet remains undetermined. Heredity, contact, climate, bad surrounding, poverty, insanitary conditions were all regarded as likely causes. But about none of these it could be positively asserted that this particular thing was the cause of leprosy or of its spread. Today the position remains practically where it was years ago with only this change that eminent scientists have agreed to say that climate, poverty, insanitariness and heredity have nothing to do with the occurrence of leprosy. Rogers and Muir think that the contagion is spread by close contact. Rogers analysed and found that out of every 10 lepers,

2 cases were through sexual contact

2 , , , , personal attendance

2 , , , , close association

4 , , , , living in the same house.

He is a believer in contact hypothesis. According to him leprosy is communicated probably by close contact. He has shown however that even this communication by contact is indifferently done, for in families where lepers live in close contact and without any restriction, out of 100 persons so exposed only 3 get leprosy. This is almost giving away the case of contact hypothesis for the cause and propagation of leprosy.

On the contrary, Hutchinson has established that leprosy is neither hereditary nor communicable by contact in general. He thinks that leprosy originates

LEPROSY LEPRA BACILLI

with the use of tainted fish under special circumstances and spreads by commensal communication or by taking of food or drink contaminated with lepra bacilli. Leprous mother's milk contains bacilli and children nursed by leprous mothers run the risk of contagion. Eating of food cooked by persons having leprous wounds in their hands or eating together with leprous persons from the same dish may communicate leprosy, but it is not communicated by skin to skin contact.

He arrays the known facts regarding leprosy as under.

- (1) It is of world wide distribution.
- (2) It is of great antiquity.
- (3) It has a marked preference for certain localities.
- (4) It is the same malady in all regions and all races.
- (5) It is of very scattered and scanty occurrence in many large districts which never become free from it.
- (6) There is absolute absence of any evidence of contagion in connection with leper asylums.
- (7) A large number of victims assert that they had never been exposed to any risk of contagion.
- (8) It is remarkably persistent in some localities.
- (9) The proof of its being transmitted hereditarily is for the most part, negative.
- (10) In no region where it has been long established, although it may have counter foci, does it ever in any locality assume epidemic prevalence.

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- (11) It is prone to die out and leave large communities, amongst whom it had been prevalent, entirely free.
- (12) In all declared cases it has a bacillus which very closely resembles that of tuberculosis.
- (13) Experiments on inoculation have almost invariably failed.
- (14) No primary sore or patch suggestive of infection by the surface is identified.
- (15) It may have almost indefinitely latency or incubation
- (16) In almost all countries and in all ages in which leprosy has prevailed there has been a more or less general popular belief that it has been caused by fish eating.
- (17) When the communities living in close proximity, the one addicted to hunting, the other to fishing, the latter may suffer severely and the former may wholly escape.
- (18) It had been wholly or almost wholly absent from Cape Colony Natal, the Sandurkh islands and some other places until factories for the curing of fish were instituted.

Upon these facts supported by innumerable corroborations of spread of leprosy along the route of salted fish trade, Hutchinson established and elaborated his theory that leprosy originates with the use of tainted preserved fish and is spread by what Hutchinson calls "commensal communication".

COMMENSAL COMMUNICATION

The fish hypothesis is not at present prepared to suggest the precise mode by which fish becomes the cause of the disease or to specify any particular kind of fish, other than that it is fish in a state of partial decomposition. It assumes that really fresh fish and really well-preserved fish are both alike innocuous, but that either cured or uncured fish in commencing decomposition may occasionally contain an ingredient which shall be effective in the causation of leprosy. Whether that ingredient be bacillus itself or some toxin capable of stimulating and differentiating the tubercle bacillus already present in patient's tissues it does not profess to decide. It assumes that it is probable that even in fish in a state of decomposition the presence of the dangerous ingredient is exceedingly rare but that a very small quantity of fish containing it may be efficient in the production of the disease. Thus large or small consumption of fish has comparatively little to do with the matter. It is not the excessive use of fish but the accidental reception of a specific ingredient in connection with it, which determines the occurrence of the disease.

"In these respects leprosy ranges side by side to a considerable extent with tuberculosis. As the latter malady may be communicated by contaminated milk or meat received into the stomach, so it is suggested that contaminated fish produces leprosy. The risk of leprosy is not increased by the very free use of either milk or meat or both provided they are taken in a sound condition, nor does the smallness of

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quantity taken give any security if the bacillus be present.

"Under the head of "commensalism" are included all possibilities of reception of the bacillus into the stomach by the agency of contaminated food. Thus sweetmeats taken by children from the hands of lepers, eating with the same dish are all possible modes of such communication. In these instances there is no question of a toxin, it is the bacillus itself which in all probability is received. In the Madras Hospital, I saw two leper children, both about four years old, both in good health but both showing unmistakable signs of leprosy. In each instance the child was born of a woman who was an inmate of the asylum and had been suckled by its mother. Now a large mass of facts discredits the belief that leprosy can be transmitted by inheritance and it is very unusual indeed for children of leprous parents to show as was the case in this instance, indications of disease during early childhood."

"The leprosy bacillus has been detected in human milk and by far the most plausible supposition appears to me to be that this was the mode in which it had been communicated in these instances. On the other hand, it might have been taken from sores on mother's limbs or nipples for both the women were the subjects of tubercular form of disease."

"At Lahore I saw a baker who although a leper was still following his occupation and who came to the hospital, because he had sores on the hands, which, he said made it difficult for him to do his work".

COMMENSAL COMMUNICATION

Hutchinson made a tour round the world to test the truth or otherwise of his fish hypothesis. He got confirmatory proof of his proposition wherever he went. He recorded instances where there was no leprosy, but where new cases were appearing and proved that invariably the persons attacked had some time or other taken salted fish of doubtful quantity. The kaffirs supply a striking example. They do not take fish, on the contrary they abhor fish, so much so that no kaffir woman will knowingly marry a kafir who takes fish. Now, near about kaffir land on the other side of the river is the Dutch settlement where labourers are taken for working in the mines or fields. They are fed by the owners of the mines or farms. There, salted fish is given for eating. The kaffirs take fish here but always publicly deny that they had taken fish for fear of losing caste with their people. Now these people in contact with Europeans take fish and by chance but rarely get leprosy. When they return home they mix freely with other members and eat from the same pot, thus give chances of commensal communication. In this way stray cases of leprosy are now met with amongst the kaffirs. Similarly in China he found that in the northern portion there is no leprosy. The land is dry with very few rivers. Fishes are rare. Fresh fishes are mostly eaten and whatever is salted is salted plentifully. There is little risk of people getting tainted fish and thereby acquiring leprosy. In contrast with this we find Southern China full of lepers. The place abounds

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in marshes and fisheries. Lots of fish are caught, preserved and transported. Here salt is scarce and dutiable so that curing is imperfectly done. The foul odour due to imperfect curing is no disqualification to the eatableness of fish. People eat this stuff and by chance a quantity having gone so bad as to develop leprosy-creating toxins in it, serves to infect people with leprosy.

Dr. Hutchinson toured extensively in India and was cross-examined and was confronted with apparently insoluble problems. He was told that there was a lot of fishing trade in Balasore but there was no leprosy. But on going to reply to these details he found a situation which quite fits in with the fish hypothesis. In his book Dr. Hutchinson quotes from a paper which appeared in Indian Medical Gazette "A geographical sketch of leprosy and the question of its relation to the consumption of fish in Bengal, Behar, Orissa and Assam.

"I have stated that leprosy is prevalent in one particular spot in the district of Balasore and I now propose giving a slight sketch of the place and its inhabitants. Kaligaon is a village consisting of 177 mud huts and is situated 8 miles south east of the civil station and five miles from the sea. It skirts a salt swampy tract of land and is very low being in what the natives call a *pal* or *sancer*. During the rains a considerable portion of it is under water and it is very difficult of access. Rice is extensively grown on adjacent tracts and a large quantity of vegetable is

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grown by irrigation from ponds and khals. The water supply is bad. There is no more than the usual overcrowding. The people generally are said to be well-to-do and other respects in which their diet differs from the general population are that they eat more fish and less dal and perhaps more salt. There is a population of 946 inhabitants consisting of 323 adult males, 300 adult females and 323 children. They are principally members of Brahman, Khandait and Khanda castes, there also a few fishermen. Of the 946 persons, no fewer than 45 are lepers and considerably more than half are Gokhas, Khandras, Khandait and Khadals. It is most prevalent amongst the Gokhas and Khandras, especially the first. The Gokha is, as I have before explained, the fisherman caste. The fact of the disease being so prevalent amongst this class is undoubtedly remarkable and certainly seems to indicate that the consumption of fish does exercise some influence in producing this disease."

Hutchinson says that the Roman Catholic Church prohibits taking life during the fast days and in the long period of fasting fish is eaten and where fresh fish is scarce salted fish is eaten. But salting is done indifferently in many places and in those places wherever Roman Catholics have gone they have caused the appearance of leprosy. He has shown that even in India, Roman Catholic Indians are the worst sufferers amongst the whole population. Hutchinson has traced the chronological prevalence of leprosy in

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Europe. Leprosy became very prevalent throughout England and Europe in the 11th century. It was at its highest in Europe in the 13th century except in Russia where people belonged to the Greek Church according to which both flesh and fish were prohibited during the fasts.

With the improvement of salting fishes the disease began to die and is extinct in many places in Europe. That segregation has had no effect is admitted by all scientists. Dr. Rogers who believes in contagion also avers that compulsory segregation has failed wherever it has been introduced

Dr. Hutchinson shows as a better and more rational way of dealing with leprosy with a view to prevention of occurrence and stopping of spreading. Steps should be taken to cure all fish properly and train men in the necessity of eschewing tainted fish. This will stop new origin of cases of leprosy Those who have got leprosy should have nothing to do with the preparation and distribution of food Care should be taken that by no means food contaminated by their touch may be used by others. For those who have leprosy, fish fresh or salted should be eschewed for it has been seen that the free use of even fresh fish aggravates the distress of lepers.

The cases of leprosy with deformities and festering ulcers that meet one's eyes anywhere are least amenable to treatment. Treatment to be effective should begin at the earliest stages possible Lepia patches show positive reaction in bacteriological

NODULAR LEPROSY: NERVE LEPROSY

examination after considerable growth. So patches should be treated even so early that bacteriologically negative result is obtained. The onset is usually insidious. At first there are tissue changes on the skin. They are painless and unless the face is affected these are likely to be overlooked. The disease is generally of a very slow growth and when the patient's health breaks down due to some other cause, it is only then that extension of these patches takes place. In a few cases there is acute onset with a rash-like redness of the skin often accompanied by fever. This is the first stage. There is a superficial redness or whiteness of the skin. There are no toxic symptoms. Later on, lepra bacilli begin to multiply and attack skin or nerve. The spots increase in size and show nodular thickening of the skin or thickening of the nerve.

In nodular leprosy of skin type the patches which were smooth in the first stage becoming thickened at the second stage produce an exaggeration of the natural folds of the skin. The surface of skin then takes a mosaic-like appearance. Later still these folds gradually disappear on account of all round thickening, and the appearance is of a general thickening in patches. These slowly develop into nodules which are full of active lepra bacilli. These get exposed on slight abrasion and are likely to infect other persons coming in commensal contact.

The other type of leprosy is the nerve leprosy. In it the terminal nerve fibres being affected cause

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depigmented or white anaesthetic light patches. There may be hypersensitiveness for a short time before all sensation is lost. The skin is thickened with a shiny smooth scaly appearance. The palms of hands or the soles of feet may show these changes. The hairs grow thick and fragile and break off and the nails also show malnutrition. In this form a central depigmented area may be surrounded by a red raised ring. The disease spreads up the terminal sensory nerves. The most affected nerve is the ulnar nerve at the end of the elbow. The nerve trunks in the neck are also affected and there is thickening of the superficial nerves in other parts of the body also.

When the nerves of the elbow are affected there is loss of sensation in the fore-arm and weakness and contraction of some fingers specially ring and little fingers. Gradually many muscles of the hand lose sensibility resulting in deformity and contraction. The fingers may get injured owing to the loss of sensation and then be lost through deep wounds. The bones of the fingers and feet for want of service by the nerves, gradually get dissolved. Perforating ulcers work their way and necrosis takes place. If the affected ends are surgically operated upon and cut off then healing rapidly takes place.

In the skin variety of disease nodules appear from red patches and subsequent swellings and thickening occur all over the exposed uncovered parts of the body, on the face, forehead, ears, the hands and legs, the palms of hands and occasionally soles of feet also show

LEPROSY . LEUCODERMA

thickening In some cases characteristic yellowish red patches are found on the back In advanced case the whole of the face gets thickened, ear lobules are thickened and the eyebrows fall off This is the second or most infective stage These ulcerate ultimately.

In detecting cases of early leprosy search should be made for white or light coloured patches or of yellowish red patches without sensation In suspected case the whole of the skin surface should be examined by stripping off clothes. The light coloured area should be carefully examined for sensation with a feather or a piece of cotton wool These patches may be mistaken for leucoderma But there is no loss of sensation in leucoderma, whereas in leprosy there is loss of sensation The leucoderma patches are generally more symmetrical Thickening of any superficial nerve should be looked for Similarly in detecting cases for skin type as distinguished from nerve type erythematous patches should be looked for specially on the back There is no definite loss of sensation although small areas may show this confirmatory sign There may be a thickening of the reddish patches When the patches get thickened there is a chance of getting positive presence of lepra bacilli by microscopic examination In the earlier cases of leprosy even superficial outer layer of the skin has shown presence of bacilli This indicates that from apparently healthy persons having no leprous ulcers how the disease may be communicated to others

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Existence of anæsthetic, light coloured or white or red patches may be mistaken for other diseases such as syphilis. But then the chance of contact with a leper in some previous period or the story of taking dried fish at any previous period will justify undertaking leprosy treatment at once

The skin type of leprosy beginning with red patches and then developing into thickened skin and nodules, is twenty times more infective than the nerve type. The skin type or the nodular form makes life worst. The patient dies in about ten years. Cases in which the disease appears in an acute form with fever and rapid spread of erythematous patches and formation of nodules, cases in which the fever relapses with further formation of patches are very rapid and may end the patient's life in about 2 years. These rapid cases are difficult to be checked by treatment

In the nerve variety the infection tends to die out and the lepers may remain permanently crippled and lie on for thirty years, till carried away by some other diseases, particularly tuberculosis. These nerve cases with mutilated bodies cease to become infective in about ten years. There are many cases in which there is mixed attack of both types

In advanced cases lepers secrete thousands of bacilli from the nose when they sneeze. Advanced mutilated nerve cases are beyond recovery. But here there is the one saving factor that their infectivity tends to die out before the body becomes too much disfigured.

PROPHYLACTIC MEASURES IN LEPROSY

People are to be educated about a few important things. Firstly it is not hereditary, it is not as infective as it is supposed and the horribly-mutilated nerve cases are not dangerous for they have spent up their power of infection, the patient only is individually suffering. It should be known that the disease has three stages. The earliest stage is the most amenable to treatment. The second stage is the most virulently infective stage and also difficult of treatment. The third stage again is difficultly curable and that in advanced third stage the disease ceases to be infective. The knowledge that children are more prone to be infected and that the infection is by commensal contact through food should direct that the children should be separated from patients as early as possible and children so separated should be watched and treated at the earliest possible opportunity. Leprosy may be communicated through a leprous mother's milk or breast, so where either husband or wife is leprous, they should have no child. Women having leprosy should not bear children, also for the reason that pregnancy frequently causes a marked increase of the disease in leprous women and child bearing quickly exhausts them. Lepers should not marry, where they are married they should live separate. When a child is born to a leprous parent, it should be separated so that it may have no leprous infection during growth.

The procedure to stamp out leprosy would be to examine all persons who live with lepers. Those who

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show any sign of commencement of attack should be at once treated from home by taking regular injections at the nearest dispensary. Children should be kept separate and out of contact with lepers. Those who are suffering should have a separate room, clothing, utensils and bathing arrangements. During the second stage of the disease a leper should avoid all contact with others, this being the most dangerous period for infecting others. There should be treatment from asylums where there is any. Otherwise he should be treated in his segregated room. Those who are detected in the third stage of the disease should also be treated. Very advanced third stage of the nodular form is not prolonged, the patient dies from some disease or other and it is little amenable to treatment. But treatment is necessary so that those who have still got lepra bacilli may be made non-infective and harmless for others. Similarly very advanced deformed cases of nervous leprosy should be treated to alleviate suffering and to render the condition definitely non-infective.

In order that there may be no fresh case of leprosy preserved fish eating should be given up. If preserved fish must be eaten, such only should be eaten as have been very properly salted and cured. At the present stage we find that in many villages in Bengal, fish is merely sun-dried and preserved. This is dangerous. The consequences are also obvious.

TREATMENT OF LEPROSY

Since writing this I have been informed of the existence of a village in Orissa. The village is fishermens' one and is on a river. The villagers generally speaking, are all lepers.

It is a wholesome practice for the lepers to eschew fish.

Lepers should not use public conveyances for the safety of the public. As leprosy is spread through contaminated food, in leprous area care should be taken to avoid partaking of ready cooked, soft or dry foods. Flattened rice, fried rice, prepared *roti* or *puri* are very largely sold and partaken of. If these foods by chance get contaminated, then there is the chance of getting leprosy.

Treatment consists in injecting chaulmugra oil particularly the variety known as *Hydnocarpus Wightiana* of South India mixed with 4 per cent creosote. The injection should be subcutaneous or intramuscular. Intradermal injection into many places such as putting one half to one drop oil over a point has been found to be more effective than intramuscular or subcutaneous injections. This is the infiltration method. A short guarded intradermal needle is used to prevent its penetrating too far into the tissues. The mixture of chaulmugra oil and creosote should be heated on a water bath to 45°C or 113°F and drawn into the syringe. This is about the highest temperature that can be tolerated. Cold injection causes greater irritation and also diffuses tardily. As each drop or half a drop enters the corium,

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a wheal is raised. Five to six punctures may be made per square inch. By intradermal injection of the oil a mild therapeutic effect can be obtained which continues for several weeks in the infiltrated areas. Dose either intramuscular or for infiltration is to be 0.5 c.c. for the first injection to be increased by 0.5 c.c. every subsequent dose till 5 c.c. is reached. It may be carried up to 10 c.c. per dose. After every injection febrile reaction should be watched for. If there is fever the increase of dose should be stopped. With severe reaction the injection may be stopped for a week and then started with a lesser quantity. Injection should be given once a week. It may be given twice a week judiciously. The reaction may take the form of swelling up and redness of patches, softening of the nodules or of the thickened nerve. In such a case injection should be stopped till normal condition returns when the previous dose reduced by 0.5 c.c. should be given.

Study of reaction is a great factor in treatment of leprosy. In the first and third stages there is comparatively little chance of difficulty arising. But in the second or infective stage when the bacilli are greatest in number and when the disease is most infective, much caution is necessary and the doses must be given so that severe reaction may not appear and the interval has also to be regulated. If there is reaction, too many bacilli are broken up creating toxins which serve rapidly to spread the disease over unaffected parts. A succession of very mild reaction

TREATMENT OF LEPROSY

with local swelling of the affected tissues, and very slight fever and that of short duration should be aimed at. In this way a steady destruction of lepra bacilli with the gradual production of immunity and lasting improvement can be obtained with maintenance of general health. Correct diet leads to general improvement of health and gain in weight. When there are large patches, begin with a small patch and finish that patch and then take up another not doing too much on one day. Leprosy bacilli are allied to tubercular bacilli. The career of a leprosy patient ends generally in tuberculosis and it has this other feature in common with tuberculosis that the disease gets the virulence with failing health. Improvement of health, rest and regulated exercise greatly help healing. Potassium iodide is a useful drug to supplement the chaulmugra treatment. It should be given exclusively in late stages when resistance is high and the drug is well tolerated.

Food should be fresh and easily digestible. Highly spiced and stale foods should be avoided. Milk, butter, edible green vegetables, raw germinating *mung* and fruits are particularly to be recommended.

Moderate outdoor exercise in the fresh air raises the resistance and lessens the risk of harmful reactions.

The whole body should be massaged with friction with chaulmugra oil in the sun. A daily bath is invigorating.

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Bowels should be regulated by mild laxatives. Intercurrent diseases such as malaria, kala-azar, syphilis etc which favour the progress of leprosy by lowering the general resistance should be attended to.

The mind should always be kept occupied and undisturbed. The will to get better is an important factor without which even the best treatment may fail.

Chaulmugra oil treatment has introduced an epoch in leprosy treatment. Prior to this, treatment of leprosy was unknown in western medicine. The *Kavirajes* of India have been using chaulmugra oil for combating leprosy. Research work has established that in the present state of our knowledge this is the only specific. Early cases are almost wholly cured subject to relapses in some. Of moderately advanced cases more than half got cured. This is a great deal. With the disappearance of terror and repugnance for the sufferer and with the spread of knowledge regarding infection and spread of disease coupled with more humane dealing with the lepers and treatment with chaulmugra, prospect of reducing the incidence to negligible proportion is great.

Beri-Beri

Beri-beri was regarded as a deficiency disease due to deficiency of vitamin B. But now it is generally admitted that beri-beri is not due only to the insufficiency of vitamin but there is co-existent toxic

BERI-BERI : EPIDEMIC DROPSY

condition also Beri-beri occurs in epidemic form A particular variety having nearly the same series of symptoms is called epidemic dropsy

Beri-beri attacks persons living together in the same house and also in the same locality. The patient feels weak and there may be slight fever or there may not be any fever. The legs show gradual swelling. The heart becomes weak and sometimes extremely so Sometimes permanent injury to the valves of the heart is brought about by the toxins The patient becomes short of breath and very often a black pigmentation occurs on skin on the face and on the joints of fingers or the elbow joint. The attack may be slight and pass off The attack may be severe causing permanent injury to the heart and running down the patient to such an extent that death occurs

Rice eaters are mostly attacked This points to vitamin B deficiency. Rice now-a-days means milled rice Under the milling conditions all the superficial coating is polished off giving bright glazed product But with the coating vanishes the mineral salts and very largely the vitamins Rice so denuded of vitamin is cooked by boiling in water Whatever water soluble vitamin B was left in the rice after polishing, goes out with boiling water Generally rice is boiled in excess of water and the water thrown away Thus by the time the rice is ready for eating it becomes devoid of all vitamin B Naturally when rice, which would have supplied the largest quota of

INFECTIOUS DISEASES

vitamin B, becomes devoid of vitamin B it becomes difficult to recoup the deficiency. So eaters of milled rice from which vitamin B is polished off and boiled out and thrown away may become subject to disease associated with vitamin B deficiency. But here it must be remembered that vitamin B deficiency is not all, it is only a factor, a predisposing factor in inducing beri-beri. Toxic factor must also have its place. We do not know exactly how the toxin is regenerated. But it is there and we have to find the best way of preventing the disease or combat it successfully once it has got hold of a subject. Beri-beri and epidemic dropsy are apt to recur to those who once had suffered from them. But in every succeeding attack the virulence diminishes. One peculiarity about these seasonal attacks is that any change of place at once does some good. In the new place there may be nothing particularly sanitary, still even if it is a change for the sake of change, the effects of it on the system are by no means negligible.

Glaucoma often follows the attack of epidemic dropsy and is difficult to get rid of. To some this is regarded as the differentiating test between beri-beri proper and epidemic dropsy. Gastro-intestinal irritation, indigestion, diarrhoea and constipation which are very common in epidemic dropsy are not encountered in beri-beri. In epidemic dropsy there are muscular pains in the legs and tenderness of the calf muscles but no symptoms of peripheral neuritis.

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TREATMENT OF BERI-BERI AND EPIDEMIC DROPSY

For treatment nutritious, easily digestible food rich in vitamins, sun bath and massage are to be arranged. As the heart becomes weak, rest should be taken, and a weak patient should not even sit up for the risk of heart failure. If there is any possibility of change of place, the place should be changed only if the condition of the heart will permit.

For medicinal treatment a routine course may be taken. For draining away accumulated water of dropsy, punarnava should be given. For combating toxins of the intestinal organs calomel in $\frac{1}{2}$ grain doses with soda bicarb 10 grains should be given 4 to 6 times daily followed by a saline purgative as an wash out. Generally intestinal toxin discolours the stool which develops a foul odour very different from healthy stool. Calomel works out changes in the system and after a time corrects the character of stool. With the correction of stool, skin pigmentation also begins to disappear, the depth and extent of which may be regarded as an index of the progress of the disease.

For correcting the weakness of the heart reliance should be put on arjun. In fact, arjun works wonders in maintaining the tone of a beri-beri heart. Ephedrine is a very valuable remedy when the heart is failing. Calcium lactate is also good in dropsy.

Medicinal treatment coupled with a change of place and correction of diet are all that can be done for the disease. Symptoms are to be attended to as they appear. Diet should be light and suited to the

INFECTIOUS DISEASES

digestive capacity of the individual. Bowels should be kept moved. Douche may be used to wash out the contents of the bowels.

The cause of epidemic dropsy is under investigation. Once it was believed to be due to the toxic condition created by taking rice- stored under unsatisfactory conditions. But medical opinion soon veered round to mustard oil as the cause. The latest development is that the disease is believed to be brought about by a poison which gets into mustard oil through mustard seeds being contaminated with some poisonous seeds and crushed together.

Tetanus or Lock jaw

Tetanus is an acute infectious disease caused by tetanus bacillus, an anaerobic organism. These bacilli occur naturally in garden earth and stable soil and they are normally present in the bowels of certain animals such as horse and cow and from thence they are found in their excreta. Tetanus bacilli are found in decomposing fluids, in manure and dust, particularly in stable sweeping. The bacilli find entrance into the human body through a wound or even scratches or through raw surface of any dysenteric and other ulcers of intestines or through umbilicus of a new-born child and there begin to produce toxins which act on the spinal cord and cause intense exaggeration of reflex excitability. The time taken by the poison created by the bacilli to travel up to the spine is regarded as

TETANUS

incubation period of the disease. The longer the period of incubation, the milder is the disease. This period may be from two to twenty days.

The onset is characterised by spasms of the muscles usually beginning with those of the face, neck and the jaws. The neck feels stiff and the jaws are moved with difficulty. The person frequently regards this as due to cold or thinks it to be due to rheumatism. The angles of the mouth are drawn down and the eyebrows are elevated. There is difficulty of swallowing leading to violent ejection of fluids from the mouth or through the nose. In milder cases the disease may reach up to this point and then get cured.

Persons getting stray cuts or abrasions may accidentally get attacked with tetanus. A form of tetanus very often attacks new-born babes and parturient mothers. The bacilli gain entrance through the umbilicus in one case and through the generative passage in the other. In course of a few hours or a few days the jaws become firmly closed. This is called lock jaw. Spasms of the limbs and body set in. The patient may assume the shape of a bow resting on his head and heels, the whole body being bent and out of contact with the bed. The muscles of the face get contorted giving it a frightful appearance. The pain in the limbs and at the pit of the stomach is agonising. The spasms are set up by the slightest irritation—strong light, a mild touch, a sound, a movement in the room or the veriest trifle. Even when there is no spasm the muscles remain stiff.

INFECTIOUS DISEASES

and do not return to normal relaxation except when the patient is sleeping... The thorax is affected and the breathing becomes difficult. The patient may die from suffocation or from exhaustion.

The température may remain normal but in some cases very high temperature is reached. Frequently there is suppression or retention of urine. Profuse perspiration is common.

Tetanus can be prevented by taking antiseptic precautions about wounds or open sores or cuts however trifling. In the performance of operations neglect of asepsis may result in tetanus. In some cases it has been found that catgut used for suture introduces tetanus. Cases are recorded in which several persons got tetanus through vaccination, the vaccines containing tetanus bacilli from gelatin used in preparing them.

Tincture of iodine if used freely in every cut or abrasion, will kill or prevent successful lodgment of tetanus bacilli. In cases of delivery the umbilical cord should be cut with a pair of sterile sharp scissors or any sharp knife disinfected with tincture of iodine. Strings used for tying the end of the cord should be soaked in tincture iodine solution and the end properly dressed. The midwife or *dhar* should know how to keep her hands and instruments aseptic and keep the private parts of the mother in an aseptic condition. Many lives are lost every year through ignorance and carelessness in cutting the umbilical cord and in dressing the mother.

TREATMENT OF TETANUS

Owing to the extreme excitability of the nervous system the patient should be isolated into a darkened room and kept absolutely quiet Liquid food should be given When the jaws do not move, the patient may be fed by passing a catheter through the nose and into the œsophagus under chloroform Sometimes it has been found necessary to extract a tooth to enable introduction of feeding tube into the mouth Severe spasms should be controlled by chloroform which may be repeatedly used at intervals It is more satisfactory to keep the patient thoroughly under morphia given hypodermically A plan of injecting morphine deeply into the affected muscles has been of great service Under this treatment the jaws have relaxed and food has been taken Two per cent solution of carbolic acid has been injected subcutaneously with good results Large quantities have been introduced to the extent of ten ounces in course of 24 hours Potassium bromide 20 grains every 4 hours by mouth should be given when the patient can swallow

Anti-tetanic serum should be undertaken by those who desire it and can arrange for it The earlier the serum is given, the better the outlook Strychnine poisoning shows symptoms similar to tetanus In strychnine poisoning the muscles relax after the spasm is over but in tetanus there is stiffness of affected muscles even after the spasm subsides

INFECTIOUS DISEASES

Mumps or Epidemic Parotitis .

Mumps is an acute infectious disease in which the parotid gland under the lower jaw is inflamed. In males the testes and in females the breasts are occasionally affected.

The incubation period is long, being two weeks or more. At first pain is felt under one ear with stiffness of the neck and jaw. There is a slight fever which subsides in three or four days. The swelling appears first under one jaw and then extends to the other jaw. The gland becomes tender on pressure. On account of the pressure of the swelling mastication and swallowing become difficult.

One-sided orchitis may appear as a complication. It has been found to be so in about one third of the cases. Those patients who do not take to bed with the appearance of the disease are most likely to suffer from orchitis.

For treatment a saline purgative is very useful. The mouth should be cleaned with an antiseptic wash. The patient should be confined to bed till the period of liability to orchitis passes off in about ten days. Liquid food should be given. The disease is rarely fatal but is severely contagious and spreads from children to children in school. In acute state of pain datura, aconite and opium plaster should be applied locally.

CHAPTER—XVIII

DISEASES OF SENSE ORGANS AND OF WOMEN

Affections of the Eyes and Eyelids

Stye or Hordeolum.—This term is applied to a small painful boil, an inflamed hair follicle or an inflamed sebaceous gland at the edge of the eyelid. It is generally a disease due to troubles in the digestive system. In debilitated condition of the system such diseases occur. It may also be due to the blocking of the gland by dirt or due to error of refraction. It gives rise to throbbing pain accompanied by redness, swelling and oedema of the lid and conjunctiva.

In case of stye an initial dose of purgative should be given. This is to be followed by hot boric compress. It quickly disappears on evacuating pus or on pulling out the faulty lash.

Tinea Tarsi or Blepharitis — It is the most common inflammation of the eyelids. There is considerable itching and gradually hairs begin to fall till the lashes become bald. Scrofulous children are very liable to it. A very similar condition is also caused by crab louse. On close examination these insects may be detected or eggs are found attached to eye lashes.

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Treatment consists in washing the eye lashes with warm alum lotion 2% (9 grains in one ounce) Soft paraffin or boric ointment may be applied before going to bed to prevent the lashes sticking together. Bowels are to be kept open in chronic cases Nux vomica-arsenic should be given two to three times a day General health should be improved.

In cases of children suffering from worms primary treatment would be of intestinal worms by giving santonin and purgative and then attention should be directed to the improvement of general health, deficiency treated by supply of vitamins Yellow ointment (*ung. hydrarg oxide flava* $\frac{1}{2}$ to 1%) is very useful in chronic cases.

Watery Eye (Epiphora) —It is caused by blocking of the duct which drains off tears The blocking is generally due to dirt Of other causes displacement of lachrymal gland by facial paralysis or from tinea are also important In certain cases the duct may be totally absent in the new-born.

Tears when allowed to run continually down the cheeks, irritate the skin and may cause inflammation and subsequently ulcer

It sometimes arises as a consequence of continuous work on minute objects. Old age is also a reason Exposure to cold is a very common cause Sepsis may also run from the root of the canine tooth and result in congestion of the duct

Watery eye should be treated with reference to the cause. Ordinarily an astringent lotion (2 per cent.

CONJUNCTIVITIS OR OPHTHALMIA

alum lotion) is enough. To prevent formation of abscess or to treat threatened abscesses hot fomentation with any antiseptic lotion is useful.

Conjunctivitis or Ophthalmia — It is an inflamed condition of mucous membrane covering the eyes or the lining of the eyelids. In mild cases this inflammation may not extend beyond the surface of the white of the eyes (conjunctivitis). There is smart feeling of pain and grittiness in the eyes and intolerance to light. Eyes become severely congested, red and watery. The patient feels better on keeping the eyes shut while children specially those who are scrofulous keep them shut so closely that it is often difficult to open them and examine. Pain in the forehead is a symptom. There may be also feverishness. Discharge from eyes at the beginning is watery which gradually becomes thicker and of yellowish white colour. During sleep this discharge collects and on drying causes gluing of the eye lashes. If the discharge is thick it may gradually cause much trouble and may spread to a whole family.

Cleanse the affected eyes with warm boric lotion (10 grains in an ounce) several times during day and night. If severely painful, hot fomentation is of great benefit. Rest should be given to the eyes both from work and light. If the discharge is excessive 2 per cent alum lotion should be for washing. Boric ointment should be applied at bed time to prevent the gluing of lids. Adhesion should not be forcibly

DISEASES OF SENSE ORGANS AND OF WOMEN

opened. It should be softened with warm water sponging.

Of constitutional treatment purgation is of highest importance. Salicylate may be used for pain either soda salicylate 10 grains per dose, 3 doses daily or caffeine-aspirin 2 tablets daily

In such cases patients generally tend to rub the eyes always with cloth. This should be avoided. To swab the discharge some cloth or cotton wool may be held in hand for constant use which has been sterilised.

Purulent Conjunctivitis or Ophthalmia :—It is a graver variety of the previous disease and it may also be due to the gonococcal infection of the eyes. Children get the gonococcal infection from adults from use of infected clothes. Flies are also carriers of this infection from eye to eye. It may also be a resultant of small pox or measles

Inflammation of this particular type is so severe that the middle of the eye or cornea is almost hidden. Pain is also intense. It may also be difficult to open the oedematous eye to examine. Treatment is the same as for ophthalmia only

Granular Conjunctivitis — In this form small granules appear under the lids. When very obstinate these granules may be lightly touched with copper sulphate protecting other parts from its action.

Corneal ulcer or ulceration on the central part of the eye is generally caused by ophthalmia from granular lids. On close examination preferably with a

CORNEAL ULCER OPTIC NEURITIS

magnifying glass, a very small looking white coloured ulcer may be discovered In bad cases several of these spots may occur, while the surrounding white portion may be congested These ulcers should be washed with boric lotion and then with alum lotion. An ointment of yellow oxide of mercury should be placed in the affected eye once or twice a day.

If corneal ulcer persists after treatment with boric lotion, cauterise the ulcer with strong carbolic acid A small pin-head-like swab soaked with carbolic acid momentarily touched upon the ulcer will cure it in a couple of days

Constitutional treatment is also essential Hereditary syphilis may cause this disease and should be treated

If patients are suffering from measles and small pox, care of the eyes is of great importance. Otherwise any of the above complications may arise and destroy the eyes completely

Optic Neuritis or Affection of the Optic Nerve —
Optic nerve may be affected from various sources These are tumours of the brain, meningitis, syphilis, diabetes, tubercle, nephritis, albuminuria, abuse of tobacco and local sepsis

The symptoms are dimness of vision, distorted vision, flashes of light before the eyes, narrowing of the field of vision and sometimes night blindness. Pain is generally intense from the very onset. Externally the eyes are red and watery and in some cases may be associated with purulent ophthalmia

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Treatment should be both local and general. Local treatment should be carried on, on the lines of ophthalmia. To relieve the pain salicylates and bromides should be given in doses of 20 grains each three times daily. If the pain is very acute and unbearable, opium may be given in one or two grains doses. Absolute rest is essential.

Neuralgia and Optic Neuritis :— In neglected and prolonged cases of trigeminal neuralgias, optic neuritis may occur. Pyorrhœa which is one of the chief factors of causing neuralgic affection of nerves of the eyes should be treated, if present.

Iritis or Inflammation of the Iris of the Eye — It may be caused by injuries, over exercise of the eye, venereal diseases, rheumatism, gout or tubercle. There are intolerance to light, dimness in vision, severe stinging pain of the eye and forehead and feverishness. Redness may not be very acute but it is characteristic. Only a ring round the cornea turns red, the remaining portion of the eye remaining white.

The eyes should be protected from light. Boric fomentation and boric and alum eye lotions should be given. To allay pain salicylates and bromides will be essential. Pot. iodide may be added if there is venereal history. Constitutional defects like constipation should be attended to.

Cataract :— It is characterised by degeneration of the lens in the eye. Normally the lens is transparent. It becomes opaque in cataract. It is frequent in elderly persons only. In the healthy eye

GLAUCOMA DISEASES OF THE EAR

the lens cannot be seen but where cataract occurs it assumes a white or bluish white appearance and can be seen through the pupil In cataract vision is impaired.

Surgical operation is necessary for removing cataract

Glaucoma is the distension of the eye ball due to iritis or blocking of the normal flow of lymph from the eye It is characterised by dimness of vision Coloured rings appear before the eyes The disease is worse on one day and better another Field of vision is lessened. The eye balls get hardened Sometimes there is intense pain of bursting nature of the eye balls Boric and alum lotion should be applied and rest given to them Eserine salicylate $\frac{1}{2}$ to 1% solution in 2 to 4 drops into each eye is very useful in glaucoma. Surgical operation is necessary to relieve intra-ocular tension

Night Blindness — This is generally a deficiency disease due to the lack of vitamin A and also others Treatment of this symptom should be confined to the improvement of general health

Diseases of the Ear

The ear is a very delicate organ, more delicate than most people think and it is very liable to injury The vital part of the ear has therefore been placed by nature far away from the surface, hidden in a bony tunnel In fact, it is so far unapproachable that it is

DISEASES OF SENSE ORGANS AND OF WOMEN

difficult to determine what is wrong with it And when on account of any injury it becomes necessary to approach the delicately set organ, a strong bony shell has got to be removed

Ear is not subject to many diseases but at the same time it is not free from the ailments which the whole system is subject to

Outer atmospheric air has access to the ear and if a current of cold or hot or dusty air will get into the ear inflammation may be set up

The ear exudes a kind of bitter wax, which keeps off inquisitive worms or ants This wax lines the wall of the entrance to the interior. If too much of this exudation will accumulate then this may set up irritation, cause pain, tinnitus, vertigo and temporary deafness

Foreign bodies may get in and inflame A blow may injure the delicate cochlea or may burst the drum A pimple may arise and suppurate within the ear, causing matters to accumulate and if this is not drained away, then insects may be attracted and maggots may be laid there eventually leading to great irritation, pain, inflammation and suppuration of the ear.

Children are often seen with pus coming out of the ears It is difficult to trace the spot of origin of trouble and cure the disease. Daily cleaning is one great thing. Children may get milk in the ear while being fed. The ear is to be washed with boric lotion or neem water. Such water is to be warmed to body

DISEASES OF THE EAR

temperature and then allowed to play within the ear through the nozzle of a syringe. A column of water is not to be shot out from the syringe but just a tepid disinfecting stream is to find way to the interior of the ear and wash out accumulated pus. This may be repeated daily till suppuration ceases. Oil in which garlic has been boiled may be introduced in the canal.

When there is too much accumulation of wax, it may be taken out by softening the interior with tepid oil or water. A little coaxing or syringing helps in dislodging the dirt and bringing it out. The pinna of the ear should be drawn upwards and backwards and the stream of water directed along the upper and posterior wall of the meatus. After syringing, the ear should be well dried by swabbing.

Otorrhœa —Suppuration beyond the drum causes grave mischief for there is no way of its being drained out without rupture of the drum. In such an eventuality there is extreme pain on account of accumulation of pus and then the thin membrane constituting the drum bursts to let out the pus. By bursting the drum is irreparably damaged and deafness is permanent. In order to find out whether the drum has burst, it is necessary to try to blow out through the mouth after closing it and the nostrils. The air then comes out through the ear and can be perceived by holding the hand against it or by bringing a candle near the ear. There is a passage for air from the palate to the internal ear through the eustachian tube within which the drum stands as a

DISEASES OF SENSE ORGANS AND OF WOMEN

thin partition. On one side of the drum therefore is the outer air and on the other side is the connection to air also within the mouth.

If there is obstruction in the eustachian tube there is interference with hearing. Blocking of the tube at its entrance in the cavity of the mouth sometimes takes place during attacks of cold with consequent temporary deafness. Frequent gargling with hot saline solution or condy's fluid gives relief. If a child is born with the entrance of the eustachian tube chocked with wax and overgrowth, then the child becomes deaf and consequently mute also. Cases are known in which men after suffering a deaf and dumb life from birth to twenty years had their defects removed by the simple expedient of removing the obstruction in the eustachian tube by a discriminating surgeon.

The nerves in the ear may cause pain. This would be neuralgic pain. The pain is then confined to the ear but may affect a side of the head also. It should be treated as for neuralgia.

A polypus may grow within the ear and cause pain, bleeding and also partial deafness. The polypus may be seen and then uprooted surgically.

Opening the bowels with laxative acts often in relieving pain in the ear, specially of neuralgic origin. A purgative should be tried in case of obstinate pain and followed up by methods to keep the bowels freely moved as described under constipation.

EPISTAXIS

Diseases of the Nose

Epistaxis —Epistaxis is bleeding from the nose. It may be classified into two main divisions as local and general. Local causes are injuries such as blows or fracture of the base of the skull, foreign bodies, nasal polypus, adenoids and syphilitic nose. General causes are high blood pressure, cerebral congestion, chronic nephritis, cirrhosis of the liver, violent exertions, extremes of heat and cold, congestion at the menstrual period, venous congestion, whooping cough, scurvy, kala-azar and onset of infectious fevers.

Treatment is to be directed towards arresting the haemorrhage locally and to correction of the predisposing cause. To arrest local haemorrhage cold alum lotion may be used. Cold water should be applied on the head and face and ice over the nose. Cold mud poultice may be applied locally. In severe cases the nose should be plugged with cotton wool soaked in alum lotion. The plugs should be removed occasionally. If blood trickles from an eroded vessel on the nasal septum it may be arrested by touching the bleeding point with the electric cautery.

Bleeding polypi should be removed with surgical aid. Diet should be light and preferably fluid. General health should be improved. For troublesome bleeding steps should as indicated under bleeding be taken.

Skin Diseases

Erythema :— This consists of light red patches of various size which appear and subside in about three days. There is considerable itching. It is not a serious thing and no medicines are necessary. The bowels should be attended to and if necessary myrobalan 3 fruits or 9 tablets in one dose should be given.

Roseola or Rose-rash :— It resembles measles in appearance but differs from measles in appearing suddenly without a prior cold. The eruptions are of irregular state. Erythema differs from it in being less rosy. It gives rise to itching. Rose-like rings may appear before small pox and in small pox season such rashes should be looked upon with suspicion.

Urticaria or Nettle Rash (*Ambat*) :— Sometimes there is a sudden itching feeling and forthwith small or large patches appear which have a surrounding of red band or margin. These rashes may last only a few hours and automatically disappear leaving the patient none the worse. Digestive trouble, dietetic error or costiveness generally accompanies such an eruption. The rashes may remain for days and cause considerable suffering. In severe cases there may be vomiting and slight fever. Some particular article of food may induce these rashes in peculiarly disposed persons. Taking of irritating medicines such as quinine, arsenic, antimony, santonin, soda salicylate etc. may cause rashes to appear.

URTICARIA LEUCODERMA

Bowels should be moved by use of a brisk saline purge and the contents of the intestines washed out with the help of enema Locally cooling lotion containing 0.5% carbolic acid is useful in relieving the irritation. Intestinal worms should be treated with santonin Soda bicarb in 30 grains doses is a general soothing agent Calcium lactate in 10 grains doses two or three times a day hastens the cure

Leucoderma — It is depigmentation of patches of skin which first becomes red and then becomes white It is often called white leprosy But it is not leprosy and has no connection with it Sometimes leprosy shows light coloured patches on the skin and from that leucoderma may have got the odium of leprosy attached to it It is a harmless skin disease It is not contagious The only trouble about it is that it disfigures a person.

Treatment

Babchi seeds ..	1 dram
Harital red ...	1 dram
(Arsenic sulphide)	

made into fine powder and then rubbed into a smooth paste with cow's urine or simply water

The paste is to be applied on the patch daily. The paste has to be made fresh otherwise cow's urine turns rancid and emits foul odour In a few days colour begins to change and spots with normal colour begin to appear and soon the entire patch is healed.

DISEASES OF SENSE ORGANS AND OF WOMEN

Ringworm :—It is a common disease which spreads by contagion. The disease is caused by a sort of fungus grabbing into the skin through a break. The fungus causes irritation and raises vesicles. It then spreads in a circular manner in the shape of a ring widening its circle and leaving the interior scarred. The fungus or active disease is only on the margin of the ring.

A variety attacks the scalp and another variety attacks the skin, while a third variety particularly chooses the area where the scrotum and thighs touch. All these forms are troublesome.

The whole body should be rubbed well with camphor and cocoanut oil (5 to 10 gr in 1 oz) before bath. Sulphur and camphor dusting powder (sulphur $\frac{1}{2}$ to 1 dram, boric acid $\frac{1}{2}$ dram, camphor 40 grains and starch 1 oz) sprinkled lightly over moist areas of ringworm after bath is a reliable prophylactic measure.

Treatment consists in applying ointment containing mild organic antiseptic acids like salicylic acid and benzoic acid (15 grains each in vaseline 1 oz). But sometimes this mild treatment is not enough. For drastic cure acetic acid diluted with twice its weight of water is to be applied with a swab on the spots. The skin on the affected places becomes white and swells and there is a burning sensation. As soon as the whiteness appears extra acetic acid is to be washed off for no more is necessary at one application. If rather strong acetic acid is allowed to remain long in contact with skin, then the skin will be injured and

SCABIES OR ITCH

may give rise to an ulcer. Such ulcer is difficult to cure, hence care should be taken.

Scabies or Itch. Itch is caused by the gravid female acarus scabiei which burrows under the skin. The female is larger than the male and may be seen as a greyish white moving atom with naked eye.

Really it is a tortoise-like creature with strong jaws. Once these can get in a skin, they burrow on and do not come to the surface. The male and female breed and produce their young. After a time these burrows become open sores. They suppurate and form scales on the top. These scales keep off all medicines and suppuration goes on. A scale on becoming thick peels off, then another scale is formed. Pus and blood from the sores contain the living creatures and when they come in contact with the skin of another person affect him with the disease.

Ointments are no good. It is difficult for ointments to kill the parasites. The most successful method is to let them be washed out with the blood oozing out of the sores. The sores are to be superficially cleaned with carbolic soap and then rubbed with some coarse cloth. After a little rubbing blood begins to come out. The act of bleeding should be allowed for a time and care should be taken to see that bleeding occurs from the entire surface of the sore. The process is painful but sure. The parasites get detached by rubbing and then are washed off with blood. If this treatment is repeated for three days, cure is certain. Otherwise

months may pass while sorts of ointments are ineffectually tried which do not reach the parasites being shut off by a thin or thick layer of scale or of tissues. Even when the scale is taken off, pus cleaned and disinfecting ointments applied, they remain without action for the parasites grab deep. The only way is to dislodge them by rather hard rubbing on the sore.

When the itches suppurate, they cause great pain. Immediately after a rub, there is relief from pain. After a good washing any protecting ointment may be put just as a covering for the sore. Sulphur ointment is particularly useful after bleeding.

Intravenous iodine 1 c.c. every third day is good for such diseases. General health and hygiene should receive closer attention in these diseases. Itches indicate unhygienic condition of living. The skin is covered with bright red eruption from which little watery heads or vesicles appear and eventually these may contain pus.

The area should be rubbed with a coarse towel and warm water. The vesicles with white matter or water are crushed and thereby the itching is relieved. A solution of soda bicarb 2 drams per pint will allay itching. The area is to be wiped dry and dusted with any harmless boric powder or arrowroot. Bowels should be attended to and only light food should be given. All clothes next to the skin, bed sheets, pillow cases etc. should be boiled in hot water occasionally and sun-dried.

PRURITUS : HERPES

Pruritus or Itching — Itching sensation is felt sometimes around the anus or the private parts and often the sensation is uncontrollable. The cause may be lice or irritation of nerve endings. If due to lice they should be removed individually. Application of turpentine will kill the worms but not the eggs so two more applications may be needed after three or four days' interval for complete removal.

When the itching is due to irritation of nerve endings general soothing applications to the skin are useful. Internal remedies are rarely of any use but chota chandra may be tried as a soother. Calcium lactate in 10 grains doses twice daily is also useful. Itching near the anus, specially of children is more often than not due to thread worms. The worms should be killed by bringing them in contact with common salt. Common salt in saturated solution may be put in with the help of a syringe or as described under thread worms.

Herpes :— It often appears on mouth corners and lips during acute febrile diseases or due to local cold accompanied by disorder of bowels. There is an inflammation and then a crop of fine little vesicles appear and there are pain and itching. The vesicles on the inflamed base then burst and form a scab. The scab after a day or two breaks giving rise to bleeding. After some days of annoying bleeding the scale dries off, the inflammation subsides and the place gets healed.

DISEASES OF SENSE ORGANS AND OF WOMEN

For treatment, bowels should be kept moved. Locally very hot boric compress so as almost to scald often arrests the growth of herpes. After the scales have formed, free application of boric dusting powder quickens healing Iodine internally also externally as a paint is helpful.

Eczema :— The skin at first becomes red and then raised vesicles crowd together on broad irregular patches with much smarting tingling sensation and itching. The fluid in the vesicles becomes soon milky and then the vesicles burst. Yellowish green scales are formed. There is continual oozing out of fluid. The surrounding skin gets affected while the portions first attacked remain sore. Eczema attacks different parts of the body, the legs and the back of ears are favourite places. It occurs on the hands also and in fact, on any part of the body. The disease sometimes remains dormant only to reappear in certain seasons. The weeping of fluid is particularly troublesome while the skin assumes a ghastly appearance from continuous existence of sores.

This may be regarded as constitutional disease, local causes combining to keep the malady on. It is often chronic and very troublesome to the patient and is also intiaitable.

The general health of the patient should be improved. Bowels should be kept moved with saline purgation and regular sun and water baths should be taken. The patches in acute stage do not tolerate greasy ointments well. Dusting with boric powders

ECZEMA BLEBS

may give temporary relief If papaya tablets made from papaya milk dried with sugar are rubbed with water on the area, very satisfactory result is obtained in some cases Others have been known to yield to a course of treatment consisting of alternate injections every week of chaulmugra oil intradermally and iodine intravenously

Cleanliness and dry bandaging with antiseptic powders are necessary

Blebs — These are blisters which suddenly appear on the skin of children The blebs appear in crops and are round or oval extending to over small areas as large as rupee pieces The contents of the blister become turbid and the blister bursts in two or three days The place then ulcerates and a scab is formed on the top The ulcer may heal in a few days or may linger causing great distress to the child for the blister may be at many places which make it difficult to handle the child without injury

The origin of the trouble should be sought for in the digestive system and corrected Nothing more can be done than application of antiseptic ointment such as sulphur or boric ointment at later stages In the early stage the blister should be punctured with an aseptic needle point and the fluid drained taking care that the skin over which the fluid flows is washed with antiseptics such as neem water or thymol lotion After draining, the sore should be dusted with boric acid and dry bandaged This often quickens the process of healing

DISEASES OF SENSE ORGANS AND OF WOMEN

Sudamina, Miliaria or Prickly Heat :— This is an eruption of numerous watery vesicles like pin-heads. Perspiration and heat cause these to appear over large areas. Massage with mustard oil and then friction with moist towel is the best remedy. Use of soap only helps to aggravate the suffering. It is a disease of the sweat glands and oil, not soap is indicated. After massage and moist friction toilet powders with oxide of zinc and boric acid will be useful.

Psoriasis or Scaly Eruption :— The skin becomes reddened and small round shining itching spots are formed. These become covered with scales which after a time fall off leaving a red surface upon which a scale again forms. The patches invade neighbouring area and extend. It is always dry. In a particular form the disease attacks elbows, knees, armpits, palms and other places of flexure of limbs. The skin thickens and hardens and then cracks are formed. It may be mistaken for eczema but eczema is a weeping disease whereas it is always quite dry. The disease is non-contagious. Syphilis gives rise to similar disease but such psoriasis is non-itching.

Digestive system should be looked after and the bowels kept freely moved with myrobalan and occasional washing out with the help of enema. Food should be discreetly taken and if there is any item of food which aggravates the disease, such food should be avoided. For local application salicylic acid gr. 15 in vaseline 1 oz. may be used. Soda salicylate may be given internally. In chronic

CHAPS . CORNS

cases arsenic may be given internally for a long period

Arsenic--1/20 grain
made into tablet or taken mixed with sugar
3 tablets per day after food

Chaps — It is roughening of the skin of the hands, feet etc under the influence of extreme cold. The skin cracks and lips and temples of delicate persons may crack, swell and bleed. The parts should be protected by covering and ointments such as boric ointment should be applied. Many cosmetic preparations with fancy names are sold for the purpose but a little boric acid incorporated in soft paraffin is quite good for the purpose.

Corns — Corns are caused by friction and pressure on the skin. These are overgrowths of the horny layer of the skin. There are two varieties, the hard and soft. The hard variety generally is seen on the feet of those who wear boots badly pressing on the toes. The common sites are the dorsal side and the head of the little toes. The hard corns are to be cut off with a sharp razor and salicylic acid in water is applied and another horny layer sliced off the next day. A fresh coating of salicylic acid solution is applied. The great thing is the removal of pressure. By slicing off and repeated use of salicylic acid the skin becomes normal, if in the meantime pressure is removed.

The soft variety is formed within the interdigital spaces. They are raised swellings of the size of a lentil, covered with sodden epidermis and are very

DISEASES OF SENSE ORGANS AND OF WOMEN

painful. They are invariably found associated with interdigital ringworm. The treatment should be as for ringworm.

Diseases of the Anus and Rectum

Piles or Hæmorrhoids are swellings inside or around the margin of the anus, the result of a varicose state of blood vessels. The rectum is the terminal point where a large number of veins or arteries meet. Physically it is so situated that blood has to travel up against gravity. Now if there is any congestion or obstruction in any of the organs placed above, stagnation is liable to occur. Liver affection, heart disease, obstinate constipation etc. are fruitful causes of the disease.

Clinically piles are divided into external or internal.

In external piles a vein just at the end of the anus gets enlarged and appears as a dark coloured tender swelling about the size of a pea or a little bigger. After some time the swelling disappears and some thickening left on the skin. These spots are very tender and cause pain at the time of defæcation. The external piles rarely bleed.

The internal piles are situated above the anal canal and formed by enlargement of rectal veins in the mucous membrane of the gut as a series of purplish ovoid bulges. These enlargements often become large. They grow very slowly and attract attention only when bleeding. Internal piles may ulcerate

PILES OR HÆMORRHOIDS

giving symptoms of dysentery. The swellings may be pushed out externally and if not reduced may be held up by the sphincter ani when they swell and then suppurate. The piles bleed more or less profusely. The bleeding takes place during defæcation. In severe cases it may occur independently of the action of bowels, on the person standing up or on account of some pressure. Where piles are due to congestion of organs, the outflow of blood from the piles causes a reduction of blood pressure and gives the system an impetus to correct itself and the effect of bleeding piles is healthful. But if the bleeding continues perhaps daily, the loss of blood may be considerable and may counteract the healthy tendency by making the person weak and anaemic.

The existence of piles may account for various morbid conditions of the system and render persons liable to bacterial infection. On the contrary, sudden stoppage of bleeding may have serious deleterious effect in raising blood pressure and leading up to apoplexy and congestion of the liver. Piles may disappear automatically for several months and reappear. There may be inflammation of external piles with pain and swelling.

Constipation and hard stools should be avoided by taking laxatives regularly. Myrobalan is excellent for securing softness of stools and the prolonged use of it has no evil effects. Piles when obstinate may cause fissure and ulcer of the anus. In case of severe piles the stools should be kept soft.

DISEASES OF SENSE ORGANS AND OF WOMEN

or watery by the use of larger quantity of myrobalans. The patient should take rest in bed when there is bleeding and inflammation. Diet should be very simple and without spices and containing plenty of green vegetables and fruits.

Excessive bleeding may be stopped by application of ice cold water in a jet. Application of alum water 1 dram per 4 ounces will harden the surface and will have a healing effect. Two myrobalans may be boiled in water and decoction mixed with a dram of alum to make the lotion more astringent. Application of an ointment containing opium and myrobalan will soothe pain and irritation of piles.

Myrobalan in paste with water—1 dram
Opium—4 grains

To be applied on the surface of piles and in the passage. Improvement of general health and observance of rules of sanitation go a great way towards healing piles.

Urinary Diseases

Retention of Urine:— In majority of cases patients come for relief because of their inability to pass water. The bladder gradually becomes distended and is associated with great pain. There may or may not be acceleration of temperature. A distinctly swelled area of the bladder may be detected on inspection.

RETENTION OF URINE

The cessation of flow of urine may be due to obstruction at the neck of the bladder or urethra. Calculi may block the passage or a shock may upset the nerves which refuse to relax the sphincter. In these cases a sterile rubber catheter should be passed and the bladder will be emptied.

More serious obstruction may be from growth of tumour, enlarged prostate, from displacement of gravid uterus and pressure to foreign body. In these later cases a surgeon's aid should be taken.

Rubber catheters should be boiled in water and then smeared with sterile oil before use. They should be thoroughly cleansed before storing.

In cases of nervous irritation retention as happens to some children in fevers, a counter irritant will help. Water in a stream may be effectively poured on the prepuce inducing micturition. Ice cold water or a touch of ice at prepuce serves the purpose. Alternate application of hot and cold water may induce the flow.

Retention with Overflow — In some cases retained urine after the distension of the bladder has reached a certain grade, escapes involuntarily and there is a continuous dribbling flow till the bladder comes to a state of less distension. It occurs at intervals. It may often be mistaken for incontinence of urine. A proper abdominal examination of the distended bladder will reveal the position. Sterile catheter should be tried to induce normal discharge. Alternate application of heat, fomentation on the dorsal region and on the pubic region may help emptying.

DISEASES OF WOMEN

Diseases of the Breast

Inflammation of the Breast (Mastitis) :—It may occur at any age Local signs of inflammation such as heat, pain, redness, swelling, fever, leucocytosis etc are all present and if it terminates in suppuration it is known as breast abscess Acute mastitis may also occur after parturition within a month at any time when the milk glands are swelled It may also be the result of some chronic infection from sores or ulcers around the nipple or spreading of infection by lacteal ducts or lymphatics.

Treatment should be on the line of inflammatory process. Breast should be supported by a bandage.

Milk may accumulate in the breast. The child may die or fall ill and refuse to suck Milk accumulates and may then cause inflammation

When due to failure of discharge of milk the breast should be fomented and milk withdrawn by pressure directed towards the nipple or by cupping. When not due to accumulation of milk but due to cold or any injury to milk gland, boric fomentation should be applied. Turpentine may be applied. In the water used for fomentation neem leaves should be thrown in.

Leucorrhœa

It is a disease in which white discharges (whites) come out from the genitals The source of trouble may be the unhealthy condition of the mucous

LEUCORRHOEA

membrane of the vagina, cervix, uterus or the fallopian tubes It may be purulent and offensive or in mild cases simply watery or thick exudations It is one of the commonest diseases of the female sex It may be due to general debility, anaemia or other constitutional troubles, gonorrhœa, constipation etc

The discharges should be washed out daily and the parts kept aseptic and where the lining has become tender it should be hardened For douching tepid water should be used in the form of neem lotion with alum, weak potass permanganate lotion, copper sulphate lotion or iodine lotion

Neem is antiseptic and alum is astringent To the neem lotion (one leaf stalk having a score of leaves per ounce of water) is added alum in the proportion of 1 dram to a pint The part washed remains clean

Potass permanganate is a weak antiseptic and in lotion having 8 grains to the pint it supplies a mild oxidising wash in which something stronger than neem is desired

Copper sulphate lotion 1% or 4 to 5 grains per ounce of water is useful in purulent discharges It makes the surface clean of all matter and causes blood to rush in and make the area healthy

Iodine weak tincture 1 dram per pint in form of a lotion is an all round antiseptic and may be used alternately with any of the above lotions for keeping the surface free from offending bacteria In uterine cases the nozzle should be pushed far so as to wash the interior as much as possible General health of

DISEASES OF SENSE ORGANS AND OF WOMEN

the patient should be improved. Vitamin deficiency should be made up. Sun bath and massage should be used for improving the tone of the skin and muscles. The invigorating influence of water bath should be amply provided. If there are chronic diseases in the alimentary tract such as pyorrhœa, constipation etc they should be attended to. Acidity should be corrected with free use of soda bicarb. Diet should be simple. Bowels should be regulated by laxatives and alkaline drinks taken occasionally to keep the urine free.

Uterine tonics will be useless unless constitutional troubles are allayed. So much attention should be given to improve the general health. Iron tonics are very useful in all stages of leucorrhœa. Injection of intravenous iodine is very efficacious in all stages and is marked by positive results always. Other medicines should be given as the symptoms or complications demand.

Prescriptions :

- Douche.— Iodine (1 dram to 1 pint)
Potass permanganate (8 grains to 1 pint)
Alum (60 grains to 1 pint)
Neem lotion
- Injection.— Intravenous iodine 0 37 gr. in 1 c c
Caffeine soda salicylate 2 c c injected
intramuscularly, if with severe
prostration, headache and fever.
- Medicines.—(1) Convalescent tablets should be given
in all stages.

DYSMENORRHœA

Dysmenorrhœa

It is the term applied to indicate painful menstruation. There are three types of dysmenorrhœa —

- 1 Neuralgic or spasmodic type
- 2 Inflammatory type
- 3 Membraneous type

The neuralgic type may often be associated with so severe pain and vomiting that the patient may collapse in no time without any other apparent causes. It generally begins a few hours before the onset of menses, during the flow and lasts for one or two days.

In the inflammatory form the pain is dull, aching and persistent. This pain is often referred to the sacral region or deep in the lower abdomen and often shooting down the legs. The pain gradually becomes intense and is relieved totally when the flow comes in copious. It commences generally one or two days before the onset of the flow and lasts for 2 or 3 days.

In the membraneous type the pain is paroxysmal and severe and is relieved as soon as the membrane passes off. Its occurrence also is very less in comparison with the first two varieties.

Fever may or may not be present in all cases. But when the pain is very acute and the patient is much emaciated there may be high fever present in the inflammatory type of dysmenorrhœa when it is positive that the inflammation might have spread even up to the ovaries from any source of infection.

DISEASES OF SENSE ORGANS AND OF WOMEN

All these three varieties are caused by either obstruction of the flow by flexions of the uterus or by constriction of the cervix or due to undue excitation of uterine contractions.

Treatment of dysmenorrhœa should be from all sides as its causations often vary and cannot always be properly ascertained.

General treatment of all types of dysmenorrhœa should be hygienic, dietetic and medication. By hygienic treatment is meant baths and certain exercises which not only cut short the course of acute attacks but also prevents its further development.

Exercises in household occupations contribute to keeping the system normal and prevent recurrence of this disorder. Paddy husking, sweeping the rooms etc give the proper exercise needed. The disease is more prevalent therefore in leisured classes. Rest should be taken during the monthly period.

Hot sitz bath is ideal for dysmenorrhœa of all types in all stages. If there is any high temperature bath may be of cold water; if it can be avoided it is better. Application of heat in all possible forms is desirable. Hot water should be used for cleaning the parts and hot water bottles should be used while the patient rests in bed.

During the course of acute state the patient should be best confined to liquid diet mainly of milk. If unavoidable boiled rice may be given with it.

TREATMENT OF DYSMENORRHœA

Salicylate of sodium is a medicine which has got specific action on all centres which cause painful menstruation, is non-depressant to the heart, analgesic to all sorts of pain and antipyretic in fevers. Sodium salicylate works from all sides in these cases. Of other drugs there is borax which may be mixed with sodium salicylate and pot bromide in small doses of say 2 grains per dose. In very acute stages datura may be given internally in $\frac{1}{2}$ grain doses, 2 doses daily.

Saline purgatives are essential in the earliest stages in all cases of painful menstruation. And it must be taken care of that bowels remain free throughout the course of treatment.

Green ulat kambal root is very useful in ensuring painless menstrual flow. The juice of green roots 1 dram per dose thrice daily is to be taken from a week prior to the commencement of the period and continued throughout the period. Where green root is not available ulat kambal tablets may be given thrice daily in 15 grains doses. In excessive pain sodium salicylate in 15 to 30 grains doses may be taken. Potassium bromide in 10 to 20 grains doses soothes the nervous excitability. In more severe cases datura in 1 grain doses may be combined with salicylates. Datura has constipating effect which should be counteracted. In painful menstruation free purgation is essential for relief. 3 myrobalans or 9 tablets may be taken daily during the period.

Sedatives have a place in the treatment of dysmenorrhœa. Datura, as has been mentioned is

DISEASES OF SENSE ORGANS AND OF WOMEN

both an analgesic and sedative. Chota chandra may be given in 30 grains doses, where soothing is necessary.

Diet should be nutritious and easily digestible.

Conception usually cures the condition in all types of painful monthly flow.

Prescriptions :

Ulat kambal—15 grains. One dose. 2 to 3 doses daily during period. 10 grains per dose, 2 doses daily before period.

Mag. sulph $\frac{1}{2}$ to 1 oz. Start to purge in the beginning or when bowels are constipated.

Soda salicylate— 2 tablets

„ biborate (borax)— $\frac{1}{2}$ „

„ bicarb— 1 „

Pot. bromide— 2 „

One dose. All tablets to be mixed in water and given twice daily.

Hæmorrhage

Hæmorrhage means bleeding. So in females these terms generally mean bleeding from the uterus. It may be classified into two groups, hæmorrhage in excess during the monthly flow and independent of the period. The first is called menorrhagia and the second metrorrhagia. But it is very difficult to separate these two symptoms as they often occur together.

Hæmorrhage may be from the vulva or vagina, from the cervix or from the uterus.

UTERINE HÆMORRHAGE

Vulval or vaginal hæmorrhage can be readily detected and responds immediately to antiseptic and astringent local treatment.

Cervical hæmorrhage (bleeding from the mouth and neck of the womb) may be due to erosion, polypi, malignant diseases or specific infected ulcerations. Hæmorrhage after coitus is indicative of malignant diseases.

Hæmorrhage from the uterus may be due to inflammation of the inner mucous covering of the uterus (*endometritis*), acute fevers, fibrous tumours or polypi of the uterus, pelvic inflammations, subinvolution of the uterus, inflammation of the uterus (*metritis*), displacement of the uterus from its normal *situ* and extra uterine gestation (by which term is meant the condition in which the ovum is impregnated outside the womb anywhere in the fallopian tube or the ovary itself). It may occur in any age but only the development of malignant tumours or cancer are general occurrences of life after 35 and 40.

Whatsoever the causation of the hæmorrhage might be it will always manifest itself by bleeding, associated with other constitutional symptoms due to deficiency of blood.

General treatment of bleeding should be symptomatic in all forms.

To check the hæmorrhage calcium lactate in 15 to 30 grains doses should be given three to four times daily. Calcium chloride 5 to 10% in 2 c.c. should

DISEASES OF SENSE ORGANS AND OF WOMEN

also be injected intravenously. Other medicines which stop bleeding should also be given both locally and by mouth. Strong alum lotion may be given as a douche with vaginal nozzle and if necessary, the vagina may be plugged also with clean sterilised astringent gauze. Iodine also may be used in lotion as a douche Iron (ferrous sulphate) should be given internally. To ensure total rest in bed very small doses of opium may be given in 1 grain doses It has been marked that often only a morphine injection checks uterine haemorrhage

Cold water, mud or ice poultices should be applied on the lower abdomen.

Small doses of quinine combined with iron often checks haemorrhage.

Lodh and asoka are two valuable uterine styptics (drugs which check bleeding) Lodh in 20 grains doses with nux vomica 1 grain may be given 2 to 3 times a day Asoka bark (*Saraca Indica*) though its use is empirical is very effectively used in the villages by the indigenous practitioners as uterine tonic and styptic. Asoka bark is prepared in the following way :

Asoka bark—360 grains (2 tolas)

Water— $\frac{1}{2}$ seer

Milk— $\frac{1}{2}$ seer

Boil the whole thing well, till $\frac{1}{8}$ seer remains Cool down the thick decoction and take by sipping the

AMENORRHOEA

entire milk at a time The boiled bark should be strained off

Remedial treatment means treating the cause Of the foregoing causations, nothing except fever can be remedied permanently by medication In almost all other cases interference of a specialist is necessary, when the symptoms have been controlled thoroughly to find out the actual causation and take proper remedial measures Tumour, retained placenta, endometritis, cervicitis, metritis etc are all amenable to expert surgical treatment by curette, operation, radium, X-rays etc.

If the causation of the endometritis or metritis be due to specific infective processes like syphilis or gonorrhœa, then in combination with treatment of haemorrhage constitutional treatment cures the condition In these cases vaginal douche of silver solutions is very effective

When the period of flow comes near it is better that the patient should remain on very light nutritious diet with moderately light exercises Avoid strong purgatives and constipation. The patient should rest in bed when the flow is profuse Garlic one dose once daily is an antidote and is often accompanied with satisfactory results

Amenorrhœa

It is a condition in which the menses are absent Primary amenorrhœa is the term applied to the

DISEASES OF SENSE ORGANS AND OF WOMEN

condition in which menstruation has not occurred at all. Apparent amenorrhœa is that form in which the menstrual flow is retained behind an imperforated hymen. Then there are certain diseased conditions and changes which may give rise to amenorrhœa. These are pregnancy, anæmia due to any constitutional disease (malaria, kala-azar, dysentery, cholera, hook worms, syphilis, phthisis, recovery from any shock or severe illness etc.) and menopause (a condition when the menstrual flow is naturally stopped after about the 45th year.)

So in treating a case of 'amenorrhœa' a proper diagnosis should be made as to the causation. Pregnancy and menopause can be readily detected. Proper constitutional ailment should be carefully examined and treated accordingly. In all cases of constitutional diseases apart from the specific treatment, general health should be improved.

Baths and light exercises are also essential. Bowels should be kept free by myrobalans.

If absence of menstrual flow is due to imperforated hymen there will be a feeling of gradual fullness in the abdomen and breasts every month. Local examination will at once reveal the cause and a surgeon's aid should be sought for the purpose.

Menstrual flow may be disturbed on exposure to cold during the period. In such cases warm hip bath will be of great use. The flow will return and pain will subside.

COMPLICATIONS...CAUSATIONS

Certain Complications Peculiar to Women
and Their Common Causations

Disordered urination	Painful defaecation	Pain on sitting	Painful coitus
I. Complete retention from (a) tumours and (b) inverted uterus which press on the neck of the bladder.	Displacement of the uterus in any direction	Vulvular small fleshy growths on the uterus	Functional spasm of the vaginal sphincter associated perhaps with a general neurotic pain
II. Frequency increased (a) Pressure on the bladder by a gravid uterus or an uterine tumour (b) Some other urinary diseases such as gravels or calculi etc.	Retroverted gravid uterus	Vulvitis and all other acute conditions	Local causes [a] Vulvitis [b] Vaginitis [c] Urethritis [d] Urethral caruncle
III. Painful Irritation (a) Urethral troubles (b) Cystitis (c) Early stages of inflammation of ovaries.	Acute pelvic inflammation	Piles	Ovaritis or prolapse of the ovaries
IV. Incontinence of urine (unable to control)	Ovaritis	Increased pressure within the pelvis	Inflammatory conditions of the cervix, uterus etc

DISEASES OF SENSE ORGANS AND OF WOMEN

Disordered urination	Painful defæcation	Pain on sitting	Painful coitus
(a) Fistula on the vaginal wall connecting the vagina and the bladder and on uterine wall connecting the uterus and the vagina. It is a result of laceration of the vagina during delivery.			
V. Difficult urination	Uterine tumours pressing upon the rectum	Injury or affections of the sacro-coccygeal and sacro-sciatic ligaments	Retention of foreign bodies during accident
(a) Prolapsed uterus (b) After labour when parts are bruised and swollen (c) Incomplete obstruction from any cause			

Treatment is everywhere symptomatic Salicylate of sodium must necessarily accompany all prescriptions used to relieve these complications.

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CHEAP REMEDIES

The following remedies (tablets and ampoules) described in this book are available from Khadi Pratisthan. For particulars enquiries should be made to the Secretary, Khadi Pratisthan. P. O. Sodepur, 24 Parganas.

Tablets

Aconite, $\frac{1}{2}$ gr.	Mag Sulph, 20 grs.
Alum, 5 grs.	Myrobalan, 20 grs
Ammon Chloride, 5 grs.	Mercurous Chloride (Calomel), $\frac{1}{2}$ & 1 gr.
Arjun, 4 grs.	Mercuric Sulphide red (Makaradhwaja), 2 grs.
Arsenic, 1/20 gr	Nux Vomica, 2 grs
Asafetida, 2 grs	Papaya, 5 grs.
Babchi harital, 5 grs.	Potass Bromide, 10 grs.
Bael, 5 grs.	" Iodide, 5 grs.
Bala, 5 grs	" Permanganate, 2 grs.
Bismuth Carbonate, 5 grs	Punarnava, 6 grs.
Calcium Lactate, 5 grs.	Sodi bicarb, 7 grs.
Camphor, $1\frac{1}{2}$ grs.	" Salicylate, 5 grs.
Chota Chandra, 6 grs	Sulphur, 8 grs
Cinchona Febrifuge, 5 grs.	Thymol, $\frac{1}{2}$ gr.
Creosote, 1 m. m.	Tartar emetic, 1/12 gr.
Datura, 3 grs.	Ulat kambal, 6 grs.
Garlic, 8 grs.	Vasaka, 5 grs.
Isafgul, 20 grs.	
Kalmegh, 5 grs.	
Kurchi, 5 grs.	

Compound Tablets

Cinchona Iron Arsenic Nux (Convalescence)
Bismuth Cum Opio (Diarrhea)
Caffeine Aspirin (Headache)
Cinchona Ammon Benz. Thymol (Influenza)
Boro Thymol Alkali (Mouth wash)

Ampoules

Antim Pot Tart, 2% $\frac{1}{2}$ to 5 c. c	Digitalin, 1/100 gr. 1 c. c
Atropine Sulph.. 1/100 gr. 1. c. c.	Emetine Hydro, $\frac{1}{2}$ to 1 gr 1 c. c.
Bismuth Salicy., $2\frac{1}{2}$ grs 2 c. c	Ephedrine Hydro., $\frac{1}{2}$ gr. 1 c. c
Caffeine Soda Benz, $2\frac{1}{2}$ grs. 1 to 2 c. c	Iodine, 37 gr 1 c. c
Caffeine Soda Salicylate, 3 grs.	Mag. Sulph 12 $\frac{1}{2}$ & 25%
Calcium Chloride, 5 & 10 %	2 & 4 c. c.
1 & 2 c. c.	Morphine Hydro., $\frac{1}{2}$ gr 1 c. c
Camphor in oil, 1 gr. 1. c. c.	Quinine Bihydrochlor. 10 gr. 2 c. c.
Chaulmugra oil, 2 to 4 c. c.	" " 5 gr. 1 c. c.
Cinchona, 5 grs. 1 c. c.	Strychnine Hydro., 1/60 gr. 1 c.c.

ERRATA

Page	Line	For	Read
24	26	jo ed	joined
"	27	ack	back
"	28	pelvi	pelvis
25	28	oined	joined
63	9	vertibra	vertebra
185	1	Body, heat	Body heat
216	10	metabolism	metabolism
222	29	have	has
266	24	Vitamin A	Vitamin A + in unpolished rice
"	25	" B	" B +
"	26	" C	" C ? , ,
896	13	Sitz	Sitz
411	17	blundest	blandest
454	19	to bear	(Omit)
458	14	caustiveness	costiveness
528	28	forthy	frothy
587	4	forthy	frothy
547	21	midwife	midwives
688	29	mothods	methods
764	80	stod	stop
1022	19	dirrhœa	diarrhoea
1127	9-10	in a the few hours	in a few hours
1210	19	between	between



